

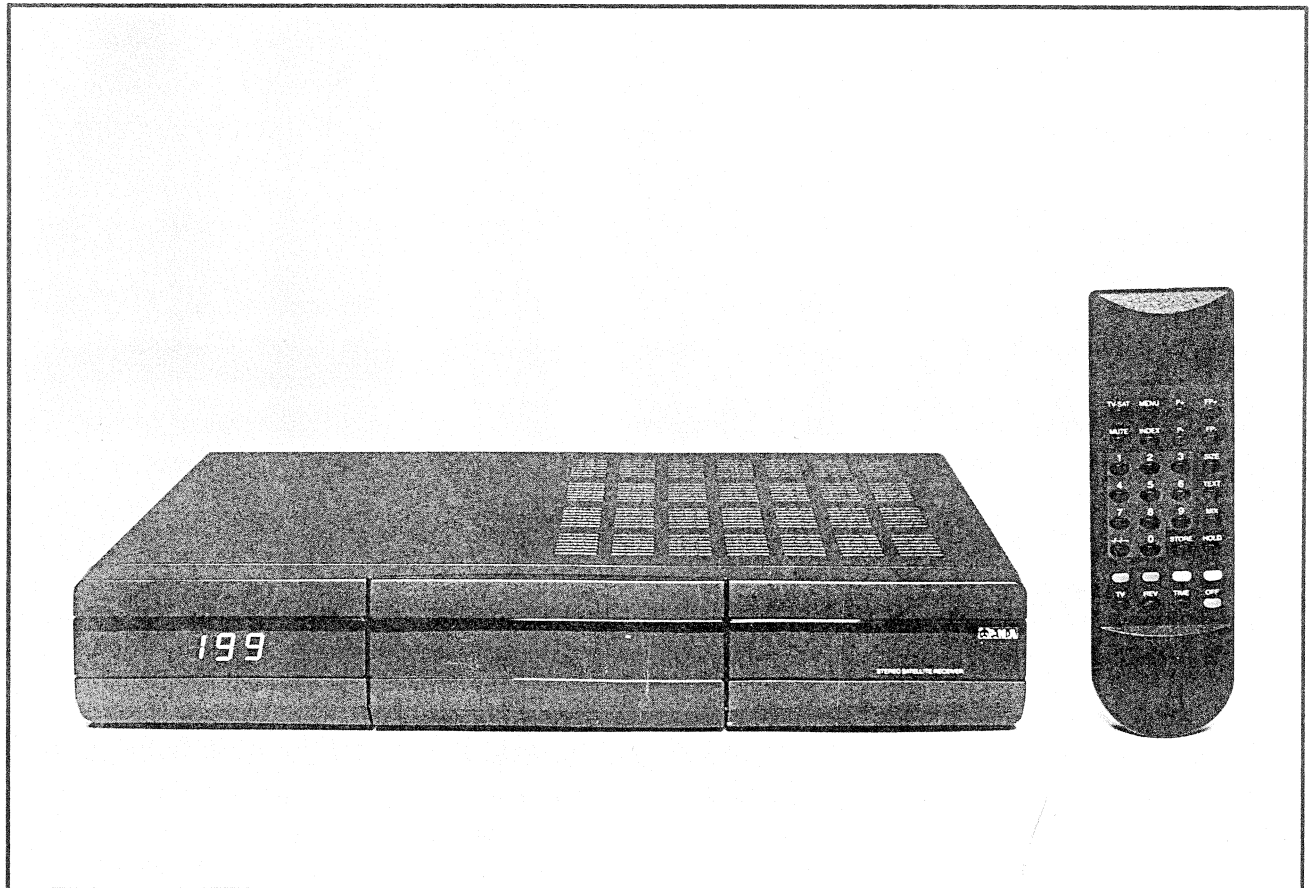
SERVICE MANUAL

Satellite Receiver

MAC Decoder

5928 / SAT 2202 CS

5918 / 3002 CS / SD 5710



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..... 5918	 3002CS	 3002CS	
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Beskrivna enheter

Denna Service-Manual beskriver följande enheter:

Satellitmottagare 5928 / SAT 2202 CS och Dekoder 5918 / 3002 CS / SD 5710 med alla dess varianter.

Varianthusnummer

Finns angivet på en streckkodsetikett på enhetens bakpanel (t ex 262 5928-15).

Tillverkningsnummer

Finns angivet på en streckkodsetikett på enhetens bakpanel.

Kretskortsnummer

Finns angivet på respektive kretskort (t ex 55 31741-25).

Skrivar

På dessa enheter användes den nya "Torx" skruven. Detta innebär att det behövs en speciell Torx-skruvmejsel storlek nr 10.

Ytmonterade komponenter (SMD):

Ytmonterade komponenter är limmade och lödda.

Vid byte av ytmonterade komponenter t ex IC och liknande komponenter med många lödningsanslutningar, behövs en del specialverktyg för att inte förstöra kretskortet.

Använd kopplingsschema och kretskortsritning för att lokalisera komponenterna.

SMD-kondensatorer saknar ofta värde märkning.

Motstånd kan ha följande kodning: De två första siffrorna är basen i motståndsvärdet. Nästa siffra anger antalet nollor. Alltså är 473 = 47000 ohm och 470 = 47 ohm.

ESD Varning!

Mottagaren / dekodern innehåller komponenter som är känsliga för statisk elektricitet (Electro Static Discharge). Service / reparation måste utföras på sådant sätt att komponenterna inte utsätts för ESD.

Säkerhetskomponenter

Komponenter markerade med  symbol är kritiska för säkerheten. Dessa får endast ersättas med motsvarande komponent enligt artikelnummer.

Alla mönsterkort är också säkerhetskomponenter.

Säkerhetskontroll efter service

Kontrollera noga att alla kabelanslutningar är riktigt fastsatta i respektive kontakter

Komponent-referenser

Varje komponent har en referens bestående av två bokstäver och två siffror (t ex IA01).

Den första bokstaven indikerar typen av komponent (I = integrerad krets).

Den andra bokstaven indikerar det kretskort eller block som komponenten tillhör (A = ljudblock).

Komponenttyp	Kretskort / block
A Kristall	A Ljudblock
Fördröjningsledning	B LNB-matning
C Kondensator	C Styrblock
D Diod	Panelmodul
F Filter eller säkring	D AGC-block
I Integrerad krets	E Videoblock
J Chip jumper	F OSD-block
L Drossel	M Transcodermodul
M Transformator	P Nätblock
P Potentiometer	T Tunermodul
R Motstånd	
S Brytare	
T Transistor	
X Kontakter	

Ändringar

Tillverkaren förbehåller sig rätten att ändra design och specifikation utan föregående meddelande.

Vid beställning av reservdelar:

Var god uppgi alltid artikelnummer, benämning, typ och serie.

Units described

This Service Manual describes the following units:

Satellite Receivers 5928 / SAT2202 CS, decoders 5918 / 3002 CS / SD 5710 with all its variants.

Variant number

Shown on the label on the rear panel of the unit (e.g. 5928-65).

Manufacturing number

Shown on the label on the rear panel of the unit.

PCB number

Shown on each PCB (e.g. 55 31741-25).

Screws

The new "Torx" screws are used on this units. Thus, a special Torx screwdriver size No. 10 is required.

Surface-Mounted Device (SMD)

SMDs are glued and soldered.

In order not to damage the P.C. board, e.g. when replacing ICs and similar components with many soldering points, special tools are required when servicing SMDs.

Use the circuit diagram and P.C. board drawing to locate components.

Only a few of the SMD capacitors are marked with value.

Resistors may carry the following code: The first two digits indicate the resistance, while the third one indicates the number of trailing zeros. Thus, 473 = 47000 Ω , while 470 = 47 Ω .

ESD warning

The receiver / decoder contains components that are sensitive to electrostatic discharge (ESD). Any servicing or repair work must therefore be done in such a way that the components are not subjected to ESD.

Safety components

Components marked with the symbol  are critical for safety. These must only be replaced with the corresponding component on the basis of article number. All PCBs are also safety components.

Safety check after service

Check carefully that all cables are properly plugged into the correct connectors.

Component references

Each component has a reference consisting of two letters and two numbers (e.g. IA01).

The first letter indicates the type of component (I = integrated circuit).

The second letter indicates the circuit board or block to which the component belongs (A = audio block).

Component type	PCB / block
A Crystal	A Audio block
Delay line	B LNB supply
C Capacitor	C Control block
D Diode	Panel module
F Filter or fuse	D AGC block
I Integrated circuit	E Video block
J Chip jumper	F OSD block
L Choke	M Transcoder module
M Transformer	P Power supply unit
P Potentiometer	T Tuner module
R Resistor	
S Switch	
T Transistor	
X Connectors	

Changes

The manufacturer reserves the right to change the design and specification without prior notice.

When ordering Spare Parts:

Please always state Part No, description, model and series.

Beschriebene Geräteeinheiten

Dieses Service-Manual beschreibt die folgenden Geräte:

Satelliten-Receiver SAT 2202 CS / 5928, Dekoder 3002 CS / 5918 / SD 5710 mit all ihren Varianten.

Variantennummer

Auf dem Fabrikschild an der Rückseite des Gerätes (z.B. 262 5928-65).

Herstellnummer

Auf dem Fabrikschild an der Rückseite des Gerätes.

Leiterplattennummer

Auf jeder Leiterplatte (z.B. 55 31741-25).

Schrauben

Diese Geräte sind mit den neuen "Torx"-Schrauben verschraubt.

Dieses hat zur Folge, daß Sie einen speziellen Torx-Schraubenzieher (Größe 10) benötigen.

Auf der Lötseite montierte Bauteile (SMD)

Die auf der Lötseite montierten Einzelteile (SMDs) sind geklebt und angelötet.

Beim Austausch eines ICs und ähnlicher Bauteile mit vielen Löt-Anschlüssen sind verschiedene Spezialwerkzeuge notwendig, um eine Beschädigung der Leiterplatte zu vermeiden.

Benutzen Sie den Schaltplan und die Beschriftung auf der Platine für die Lokalisierung der Bauteile.

SMD-Kondensatoren sind meistens nicht mit Werte eingezeichnet.

Widerstände können wie folgt verschlüsselt sein: Die ersten zwei Ziffern zeigen den Wert des Widerstandes und die dritte Ziffer die Anzahl der Nullen an. Also 473 = 47 000 Ω und 470 = 47 Ω .

Warnung vor elektrostatischer Entladung

Das Gerät enthält Bauteile, die leicht durch elektrostatische Entladung beeinträchtigt werden können. Bei allen Wartungs- oder Reparaturarbeiten muß deshalb darauf geachtet werden, daß die Teile keiner elektrostatischen Entladung ausgesetzt sind.

Sicherheits-Bauteile

Bauteile, die mit dem Symbol  gekennzeichnet sind, sind sicherheitstechnisch von besonderer Bedeutung. Sie dürfen nur durch Bauteile derselben Artikelnummer ersetzt werden. Auch alle Leiterplatten gehören zur Kategorie der Sicherheits-Bauteile.

Sicherheitsüberprüfung nach der Wartung

Prüfen Sie sorgfältig, daß alle Kabel ordnungsgemäß in die korrekten Steckverbindungen gesteckt sind.

Bauteil-Referenznummern

Zu jedem Bauteil gehört eine Referenznummer, die aus zwei Buchstaben und zwei Ziffern besteht (z.B. IA01).

Der erste Buchstabe gibt den Bauteiltyp an (I = integrierter Schaltkreis).

Der zweite Buchstabe bezeichnet die Leiterplatte oder den Block, zu dem das Bauteil gehört (A = Tonmodul).

Bauteiltyp	Leiterplatte/Block
A Quarz	A Tonmodul
Verzögerungsleitung	B LNB-Versorgung
C Kondensator	C Einstelleinheit
D Diode	Bedienteil
F Filter oder Sicherung	D AGC Block
I Integrierter Schaltkreis	E Video Block
J Chip jumper	F OSD Block
L Drosselspule	M Transcodemodul
M Transformator	P Netzteil
P Potentiometer	T Tunermodul
R Widerstand	
S Schalter	
T Transistor	
X Steckverbindungen	

Änderungen

Der Hersteller behält sich das Recht jederzeitiger Änderungen an der Konstruktion und Spezifikation vor.

Bei Bestellung von Ersatzteilen:

Bitte stets Artikelnummer, Bezeichnung, Gerätetyp und Serie angeben.

Technical data **Satellite Receiver 5928 / SAT 2202CS**

RF- and IF section

Input frequency	950–2050 MHz
Input level	–60 to –30 dBm
Input impedance	75 ohms at relevant input
Intermediate frequency (IF)	480 MHz
Bandwidth	27 MHz
FM threshold	7.0 dB static (27 MHz bandwidth with 16 MHz peak deviation)
AFC (automatic frequency control)	Yes. Range ± 9 MHz. Disabled when fine tuned. (± 16 MHz)

Rear panel

LNB inputs	IEC male (ANT IN 1), IEC female (ANT IN 2) / F-connector
LNB, supply voltage	13,5 / 18,5 V $\pm 3\%$ (programmable) Load: max 350 mA, short-circuit- proof Can be set to zero for certain SMATV networks
TV ANT IN	IEC female, 75 ohm
TV OUT	IEC male, 75 ohm. PAL G or PAL I UHF and bypass from TV ANT IN.
RF output frequencies	UHF CCIR channels 40–49, 74 ± 4 dB μ V / 75 ohm Set at factory to channel 43 (PAL G). PAL I to channel 39.
Polarisation control	Magnetic polariser max ± 120 mA, or ± 60 mA, min ± 7 V, two-pole clamp connector
Audio/video in/output to TV	SCART socket
Audio/video in/output to VCR, decoder	SCART socket
AUDIO OUT, R / L	Phono connector, 0.5 V rms for stereo system
ACU (antenna control unit)	Phono connector, max 40 antenna positions can be programmed
Switch, 0/12 V and	Phono connector, max 50 mA, short-circuit-proof
0/3/6/9 V	max 5 mA, short-circuit-proof
External card reader	6-pin "Modular Jack" connector

Front panel

Front panel, display	Three seven-segment displays (LED)
Front panel, buttons	ON-OFF, P–, P +
Card reader	Two positions

Audio/video

Audio/video output for TV	SCART: TV – PAL video 1 V pp/75 ohm at 16/19/25 MHz pp deviation or encoded from MAC, RGB signal – stereo sound 0.5 Vrms – RGB 0.7 V pp from AUX or MAC-SCART – video switching 0/6/12 V (6 V in 16:9 format) – fast blanking 0/2 V
Audio/video output for VCR / decoder	SCART: AUX – PAL 1 V pp, or PAL baseband or MAC baseband and 1 V pp – stereo sound 0.5 Vrms – video switch voltage input 0/6/12 V Transparent video/audio between the SCART connectors in standby mode.
PAL audio, frequency range	5.0 – 9.0 MHz parallel tuning
IF bandwidth	330 kHz (WB) or 150 kHz (NB) (programmable)
Audio, tone correction	50 μ s, J17 or Wegener Panda 1 (programmable)

Other data

Mains voltage	220–240 V AC $\pm 15\%$ 50 Hz $\pm 5\%$
Power consumption	25 W
Power consumption on standby	5 W
Operating temperature	+5° C to +40° C
Storage temperature	–40° C to +60° C
Operating distance for remote control	0.4 to 10 metres
Dimensions (w x d x h)	360 x 268 x 60 mm
Weight	2.2 kg approx

Rear panel

TV ANT IN	IEC female, 75 ohm
TV OUT	IEC male, 75 ohm, PAL G or PAL I UHF and bypass from TV ANT IN.
RF output frequencies	UHF CCIR channels 40–49, 74 +/- 4 dB μ V/75 ohm Set at factory to channel 43 (PAL G). PAL I to channel 39.
Audio/video in/output to TV	SCART socket
Audio/video in/output to VCR, decoder, satellite receiver	SCART socket
Baseband in/output	Phono connector
ACU (antenna control unit) in/output	Phono connector
External card reader	6-pin "Modular Jack" connector

Front panel

Front panel, display	Three green LEDs
Front panel, button	ON-OFF
Card reader	Two positions

Audio/video

Audio/video output for TV	SCART: TV – PAL video from AUX–SCART or PAL encoded video from MAC – stereo sound 0.5 Vrms – RGB 0.7 V pp from MAC or AUX–SCART – video switching 0/6/12 V (6 V in 16:9 format) – fast blanking 0/2 V
Audio/video output for VCR / decoder	SCART: AUX – PAL video from TV–SCART or PAL encoded video from MAC – stereo sound 0.5 Vrms – video switch voltage input 0/6/12 V Transparent video/audio between the SCART connectors in standby mode. – 25 Hz – 8,5 MHz +/- 2 dB, PAL–deemphasis From TV–SCART
Baseband input	
Baseband output	

Other data

Mains voltage	220–240 V AC +/- 15% 50 Hz +/- 5%
Power consumption	19 W
Power consumption on standby	5 W
Operating temperature	+5° C to +40° C
Storage temperature	–40° C to +60° C
Operating distance for remote control	0.4 to 10 metres
Dimensions (w x d x h)	360 x 268 x 60 mm
Weight	2.2 kg approx

Displayfunktioner

Följande funktioner visas på frontpanelens display

Display	Funktion	Aktivera funktionen med: "... " knappar	Gör justering med: "... " knappen(arna)
	I normalläge:		
22	Program nummer	Siffror 0-9, P +/-, FP +/-	Siffror 0-9, P +/-
F 1	Favoritprogram nummer	FP +/-	FP +/-
* 2	Frånslag av ljudet	MUTE	MUTE
r E	TV Release	TV/SAT	TV/SAT
-	Stand by	OFF, ON-OFF	Siffror 0-9, TV/SAT
13	Timerläge	MENU	P +/-, FP +/-
r E C	Timerinspelning	MENU	P +/-, FP +/-
	I Installationsläge:	MENU och "... " knappar	
13	Program nummer	P +/-	Siffror 0-9, FP +/-
n	Program namn max 32 / 41st	P +/-,	P +/-, FP +/-, -/-/----
P 4	Polarisationsinställning(P0-P9)	P +/-	Siffror 0-9 eller FP +/-
5b	Val av frekvensband	P +/-	FP +/-
C43	Kanalnummer (01-72)	P +/-	Siffror 0-9 eller FP +/-
EOO--09	Fininställning av bilden (0-255)	P +/-	FP +/-
A01--A32	Ljudkanal (A01- A32)	P +/-	FP +/-
in 1, in 2	Antenningång 1 eller 2	P +/-	FP +/-
U-, U18, U13/ PU, PH, P-	Polarisationsomkoppl.13/18V	P +/-	FP +/-
501--540	Val av antenntposition 1-40	P +/-	FP +/-
d 0	Ingen dekoder ansluten	P +/-	FP +/-
d 1	PAL basband, intern ljudsignal	P +/-	FP +/-
d 2	Pal basband, extern ljudsignal	P +/-	FP +/-
d 3	MAC basband, intern ljudsignal	P +/-	FP +/-
d 4	MAC basband, extern ljudsignal	P +/-	FP +/-
d 5	CVBS video, intern ljudsignal	P +/-	FP +/-
d 6	CVBS video, extern ljudsignal	P +/-	FP +/-
L L, L n, L H	Videonivå låg, medium, hög	P +/-	FP +/-
u 0--u 12	0, 3, 6, 9, 12 V omkopplare	P +/-	FP +/-
C43	Frekvenssvepning	P +/-	FP +/-, 0-9 för stopp

The following functions appear on the front panel display

Display	Function	Button(s) to press for function	Button(s) to press for adjustment
	In normal mode:		
22	Programme number	Digits 0-9, P +/-, FP +/-	Digits 0-9, P +/-
F 1	Favourite program	FP +/-	FP +/-
* 2	Audio off	MUTE	MUTE
r E	TV Release	TV/SAT	TV/SAT
-	Standby	OFF, ON-OFF	Digits 0-9, TV/SAT
1.3	Timer mode	MENU	P +/-, FP +/-
r E °C	Timer recording	MENU	P +/-, FP +/-
	In Installation mode:	MENU and "..." buttons	
13	Programme number	P +/-	Digits 0-9, FP +/-
n	Programme names max 32/41 st	P +/-,	P +/-, FP +/-, -/-/-/-
P 4	Polarisation setting (P0-P9)	P +/-	Digits 0-9 or FP +/-
5 b	Frequency band selection	P +/-	FP +/-
[43	Channel setting (01-72)	P +/-	Digits 0-9 or FP +/-
100 -- 09	Picture fine tune (0-255)	P +/-	FP +/-
A01-- A32	Audio channel (A01- A32)	P +/-	FP +/-
in 1, in 2	Antenna input 1 or 2	P +/-	FP +/-
U--.U18,U13/ PU,PH, P-	Polariser switch 13/18V	P +/-	FP +/-
501-- 540	Antenna position 1-40	P +/-	FP +/-
d 0	No decoder connected	P +/-	FP +/-
d 1	PAL baseband, internal audio	P +/-	FP +/-
d 2	PAL baseband, external audio	P +/-	FP +/-
d 3	MAC baseband, internal audio	P +/-	FP +/-
d 4	MAC baseband, external audio	P +/-	FP +/-
d 5	CVBS video, internal audio	P +/-	FP +/-
d 6	CVBS video, external audio	P +/-	FP +/-
L L, L n, L H	Video level low, medium, high	P +/-	FP +/-
u 0 -- u 12	0, 3, 6, 9, 12 V switch	P +/-	FP +/-
[43	Frequency scan	P +/-	FP +/-, 0 - 9 for stop

Anzeige-Funktionen

Folgende Funktionen erscheinen auf der Frontanzeige:

Anzeige der Funktion	Funktion	Zu drückende Funktionstaste	Zu drückende Einstell-Taste(n)
	In Normal-Modus:		
22	Programmnummer	Nummern 0-9, P +/-, FP +/-	Nummern 0-9, P +/-
F 1	Favorit-Programme	FP +/-	FP +/-
* 2	Ton aus	MUTE	MUTE
r E	TV Release (Videoaufnahme)	TV/SAT	TV/SAT
-	Bereitschaft (Standby)	OFF, ON-OFF	Nummern 0-9, TV/SAT
1 3	Timer-Modus	MENU	P +/-, FP +/-
r E ° C	Timer-Aufnahme	MENU	P +/-, FP +/-
	In Installation-Modus:	MENU und "..." Tasten	
13	Programmnummer	P +/-	Nummern 0-9, FP +/-
n	Programmnamen max 32 / 41 st	P +/-,	P +/-, FP +/-, -/-/-/-
P 4	Polarisation (P0-P9)	P +/-	Nummern 0-9 or FP +/-
5 b	Frequenzbandwahl	P +/-	FP +/-
[4 3	Kanalnummer (01-72)	P +/-	Nummern 0-9 or FP +/-
6 0 0 -- 0 9	Bildfeineinstellung (0-255)	P +/-	FP +/-
A 0 1 -- A 3 2	Tonkanäle (A01- A32)	P +/-	FP +/-
1 n 1, 1 n 2	Antenneneingang 1 oder 2	P +/-	FP +/-
U --, U 1 0, U 1 3 / P U, P H, P --	LNB-Spannung 13/18V	P +/-	FP +/-
5 0 1 -- 5 4 0	Antennenposition 1-40	P +/-	FP +/-
d 0	Kein Dekoder angeschlossen	P +/-	FP +/-
d 1	PAL Basisband, internes Tonsignal	P +/-	FP +/-
d 2	PAL Basisband, externes Tonsignal	P +/-	FP +/-
d 3	MAC Basisband, internes Tonsignal	P +/-	FP +/-
d 4	MAC Basisband, externes Tonsignal	P +/-	FP +/-
d 5	CVBS video, internes Tonsignal	P +/-	FP +/-
d 6	CVBS video, externes Tonsignal	P +/-	FP +/-
L L, L n, L H	Video pegel, niedriger, mittel, stark	P +/-	FP +/-
u 0 -- u 1 2	0, 3, 6, 9, 12 V -Umschalter	P +/-	FP +/-
[4 3	Start Betrieb	P +/-	FP +/-, 0 - 9 für Stop

Ljudtabell – Sound table – Tonsystem-Tabelle

Ljudsystem Audio system Tonsystem

Ljudkanal Audio channel Tonkanal	Frekvens Frequency Frequenz MHz		Stereo/ Mono	Nb / Wb	Deemp
	CH L	CH R			
A1	6.12	6.30	S	Nb	P1
A2	7.02	7.20	S	Nb	P1
A3	7.38	7.56	S	Nb	P1
A4	7.56	7.74	S	Nb	P1
A5	7.74	7.92	S	Nb	P1
A6	7.92	8.10	S	Nb	P1
A7	5.40		M	Wb	50µs
A8	6.50		M	Wb	50µs
A9	6.60		M	Wb	50µs
A10	6.65		M	Wb	50µs
A11	6.80		M	Wb	50µs
A12	7.20		M	Wb	50µs
A13	7.30		M	Wb	50µs
A14	6.50		M	Wb ^{x)}	50µs
A15	7.20		M	Wb ^{x)}	50µs
A16	7.30		M	Wb ^{x)}	50µs
A17	5.80		M	Wb	J17
A18	6.40		M	Wb	J17
A19	6.85		M	Wb	J17
A20	7.25		M	Wb	J17
A21	7.75		M	Wb	J17
A22	8.65		M	Wb	J17
A23	6.12		M	Nb	P1
A24	6.20		M	Nb	P1
A25	6.30		M	Nb	P1
A26	7.02		M	Nb	P1
A27	7.20		M	Nb	P1
A28	7.38		M	Nb	P1
A29	7.56		M	Nb	P1
A30	7.74		M	Nb	P1
A31	7.92		M	Nb	P1
A32	8.10		M	Nb	P1

Nb = Smalband, bandbredd 150 kHz

Wb = Bredband, bandbredd 330 kHz

50µs = Tonkorrektur 50 µs

P1 = Tonkorrektur Panda 1 (Wegener)

J17 = Tonkorrektur J17

x) Volymnivå för ASTRA mono ljud

Narrow bandwidth 150 KHz

Wide bandwidth 330 KHz

Deemphasis 50 µs

Deemphasis Panda 1 (Wegener)

Deemphasis J 17

Volume level for ASTRA Mono audio

Schmale Bandbreite 150 KHz

Breite Bandbreite 330 KHz

Deemphasis 50µs

Deemphasis Panda 1 (Wegener))

Deemphasis J17

Lautstärkepegel für ASTRA bei Mono

ESD varning!

Mottagaren innehåller komponenter som är känsliga för statisk elektricitet ESD.

Service / reparation måste utföras på sådant sätt att komponenterna inte utsätts för ESD.

Demontering av kretskort

Demontering av hela kretskortpaketet ur apparaten.

- 1 Tag bort skruvar (x4) på mottagarens sidor. Lyft av locket.
- 2 Böj ut två snäppen på frontpanelens sidor. Drag frontpanelen från botten.
- 3 Böj låssnäppet till panelkortet och tag bort kortet från frontpanelen.
- 4 Tag bort skruvar (x 4) på baskortet. Lossa kabelavlastningen från bakpanelen. Lyft bort kretskortet. **Lägg kretskortet på en antistatmatta.**
- 5 Lossa eventuellt transkodermodulen och / eller tunermodulen från baskortet. Tag bort skruv (x 1) och vrid låsblecken med en tång. Lyft av modulen från kontaktstiften. Tag bort den separata kortläsarmodulen med att böja låssnäppen bakåt och lyft upp modulen.

6 Demontering av displayfönster

Tryck låssnäppen (x 6) mot mitten på fönstret och tryck fönstret ur panelen.

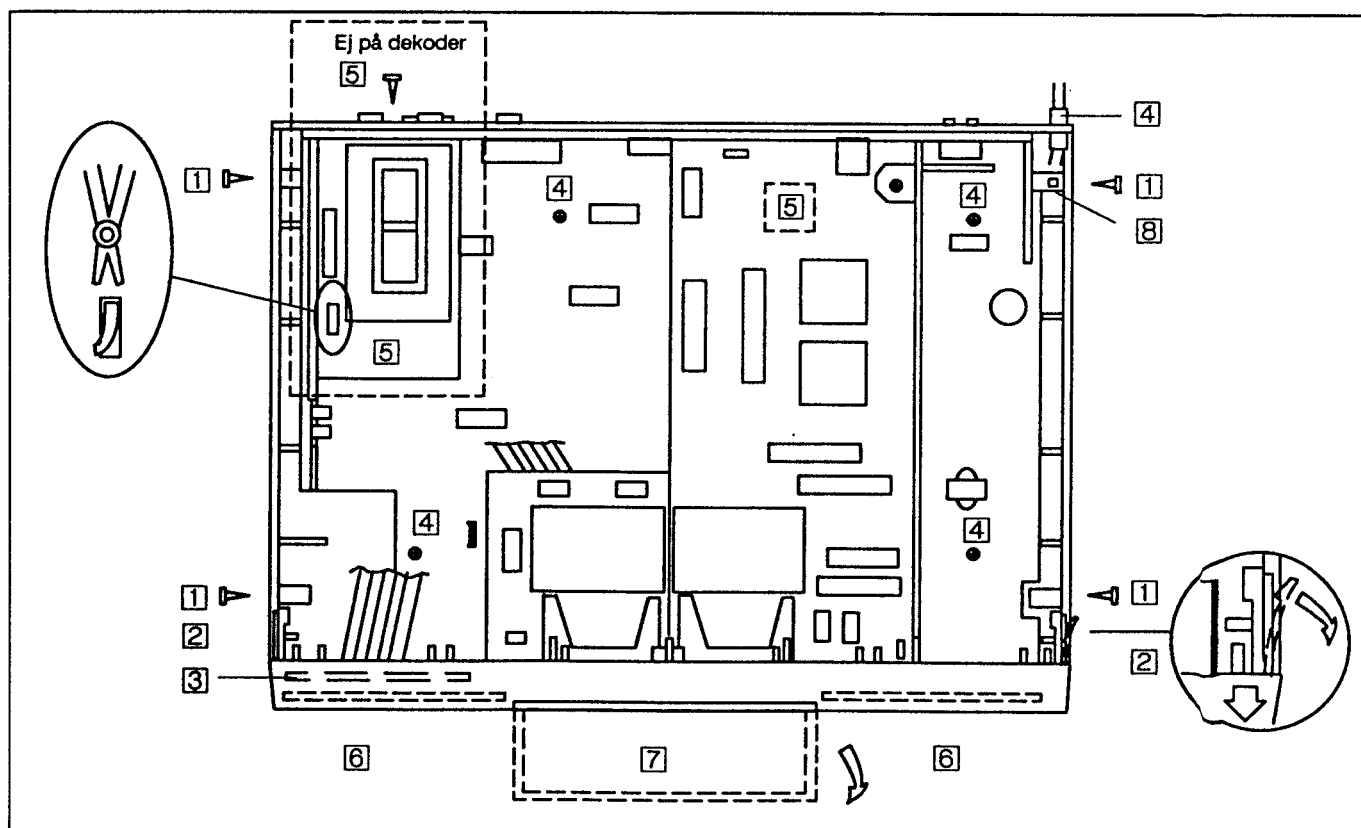
7 Demontering av frontlucka

Vrid luckan nedåt och ur låspinnarna.

Använd kretsutdragare för att ta bort kretsar ur IC-hållarna.

Återmontering av delarna sker i omvänd ordning.

OBS! Kontrollera att jordblecket (8) sitter ordentligt fast i plåten.



ESD warning

The receiver contains components that are sensitive to electrostatic discharge (ESD).

Any servicing or repair work must therefore be done in such a way that the components are not subjected to ESD.

Removing the circuit board package

Removal of the entire circuit board package from the unit.

- 1 Unscrew the screws (x4) on the sides of the receiver. Remove the cover.
- 2 Bend out the two catches on side of the front panel. Pull the front from the bottom.
- 3 Bend out the catch. Remove the panel module from the front panel.
- 4 Unscrew the screws (x 4) on the main board. Remove the cable fastening from the rear panel. Remove the main board.

Place the main board on an ESD protection mat.

- 5 When appropriate, release the transcoder module and / or the tuner module from the PCB. Unscrew the screws (x 1) and turn the locking tabs with a pliers. Lift the module upwards from the contact pins. To remove the twin card reader, bend the catch and lift the module upwards.

6 Dismantling the displaywindows

Press the catches (x 6) to the center of the window and press the window out off the frontpanel.

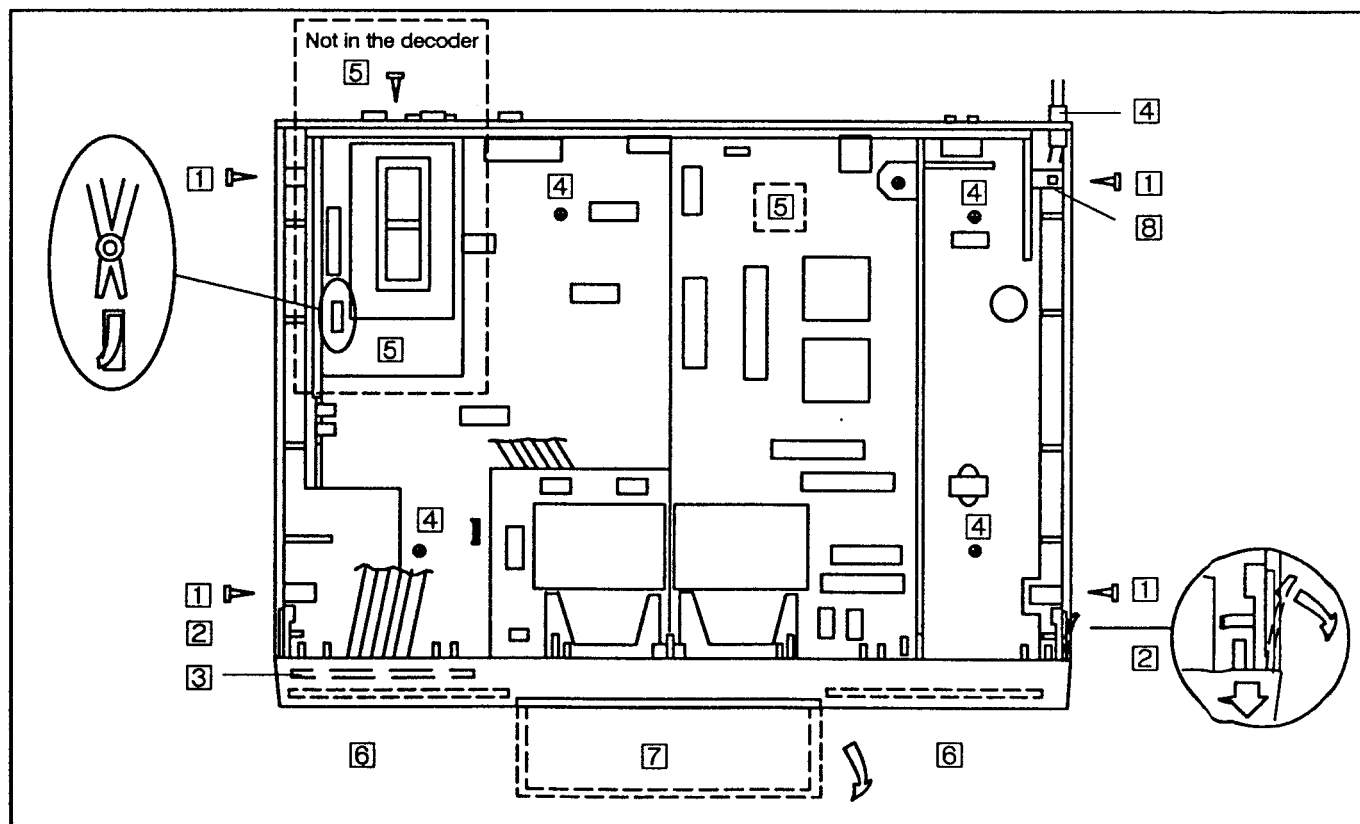
7 Dismantling the front lid

Turn the lid downwards and out of the locking pins.

Use a proper extractor to remove the ICs from their sockets.

Re-assemble parts in the reverse order.

NOTE! Check that the earth tin-plate (8) is properly mounted in the plate.



Warnung vor elektrostatischer Entladung

Das Gerät enthält Bauteile, die leicht durch elektrostatische Entladung beeinträchtigt werden können.

Bei allen Wartungs- oder Reparaturarbeiten muß deshalb darauf geachtet werden, daß die Teile keiner elektrostatischen Entladung ausgesetzt sind.

Ausbau des Chassis

Ausbau des gesamten Chassis aus dem Gerät.

- ① Seitenschrauben (x4) des Gerätes lösen. Deckel hochheben.
- ② Die beiden Laschen neben der Frontplatte aufbiegen. Die Frontplatte nach hinten abziehen.
- ③ Die Lasche aufbiegen. Das Bedienteil aus der Frontplatte nehmen.
- ④ Die Schrauben (x4) der Basisplatte herausdrehen. Den Kabelhalter an der Rückwand herausnehmen. Die Basisplatte herausnehmen.
Auf antistatische Unterlage legen.
- ⑤ Falls erforderlich, MAC-Modul und/oder Tuner Modul von den Leiterplatten entfernen. Die Schrauben (x1) herausdrehen und die Rastnasen mit einer Zange aufbiegen. Das Modul von den Kontaktstiften hochziehen.
Zum Ausbau des Kartenlesers die Lasche aufbiegen und das Modul hochziehen.

6 Ausbau des Display-Fensters

Die Laschen (x6) zur Mitte des Fensters drücken und das Fenster aus der Frontplatte herausdrücken.

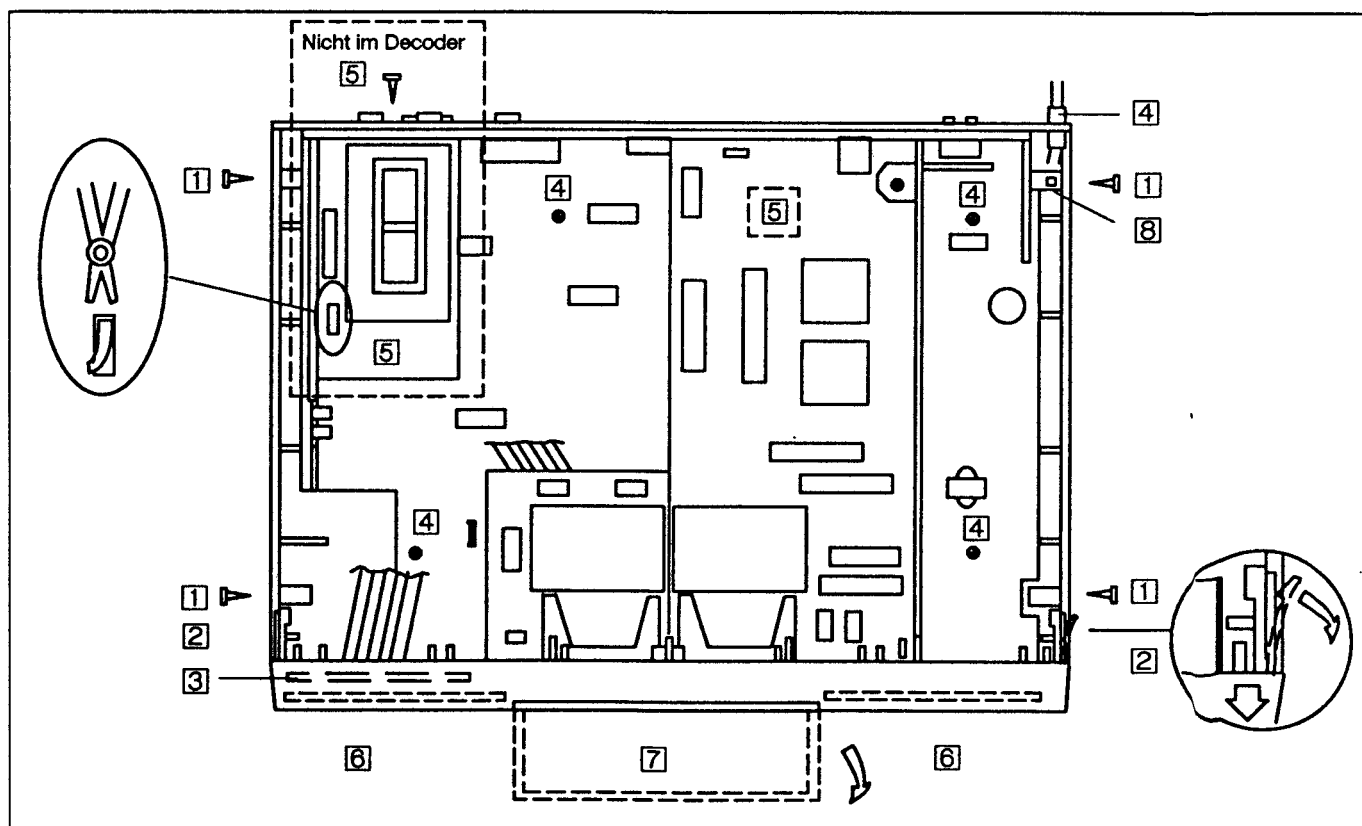
7 Ausbau der Front-Klappe

Die Klappe nach unten aus ihren Raststiften drehen.

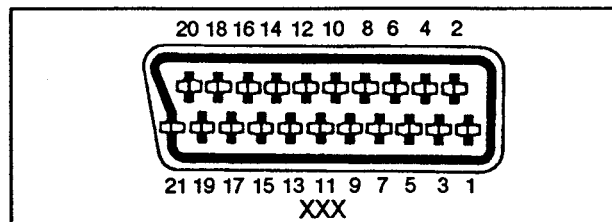
Zur Entfernung der ICs aus ihren Fassungen geeignetes Ausziehwerkzeug verwenden.

Teile in umgekehrter Reihenfolge wieder zusammenbauen.

ANMERKUNG! Darauf achten, daß die Masse-Blechplatte  richtig montiert ist.



PIN designation for SCART-connectors



AUX - SCART	TV - SCART
1 AF out right channel	AF out right channel
2 AF in right channel	AF in right channel
3 AF out left channel	AF out left channel
4 AF ground	AF ground
5 RGB blue ground	RGB blue ground
6 AF in left channel	AF in left channel
7 RGB blue signal in	RGB blue signal out
8 Switch voltage in	Switch voltage out
9 RGB green ground	RGB green ground
10 -	-
11 RGB green signal in	RGB green signal out
12 -	-
13 RGB red ground	RGB red ground
14 Fast blanking ground	Fast blanking ground
15 RGB red signal in	RGB red signal out
16 Fast blanking in	Fast blanking out
17 Video out ground	Video out ground
18 Video in ground	Video in ground
19 Video out	Video out
20 Video in	Video in
21 Plug ground	Plug ground

Transistorer

Följande kapseltyper användes till transistorer.

Transistors

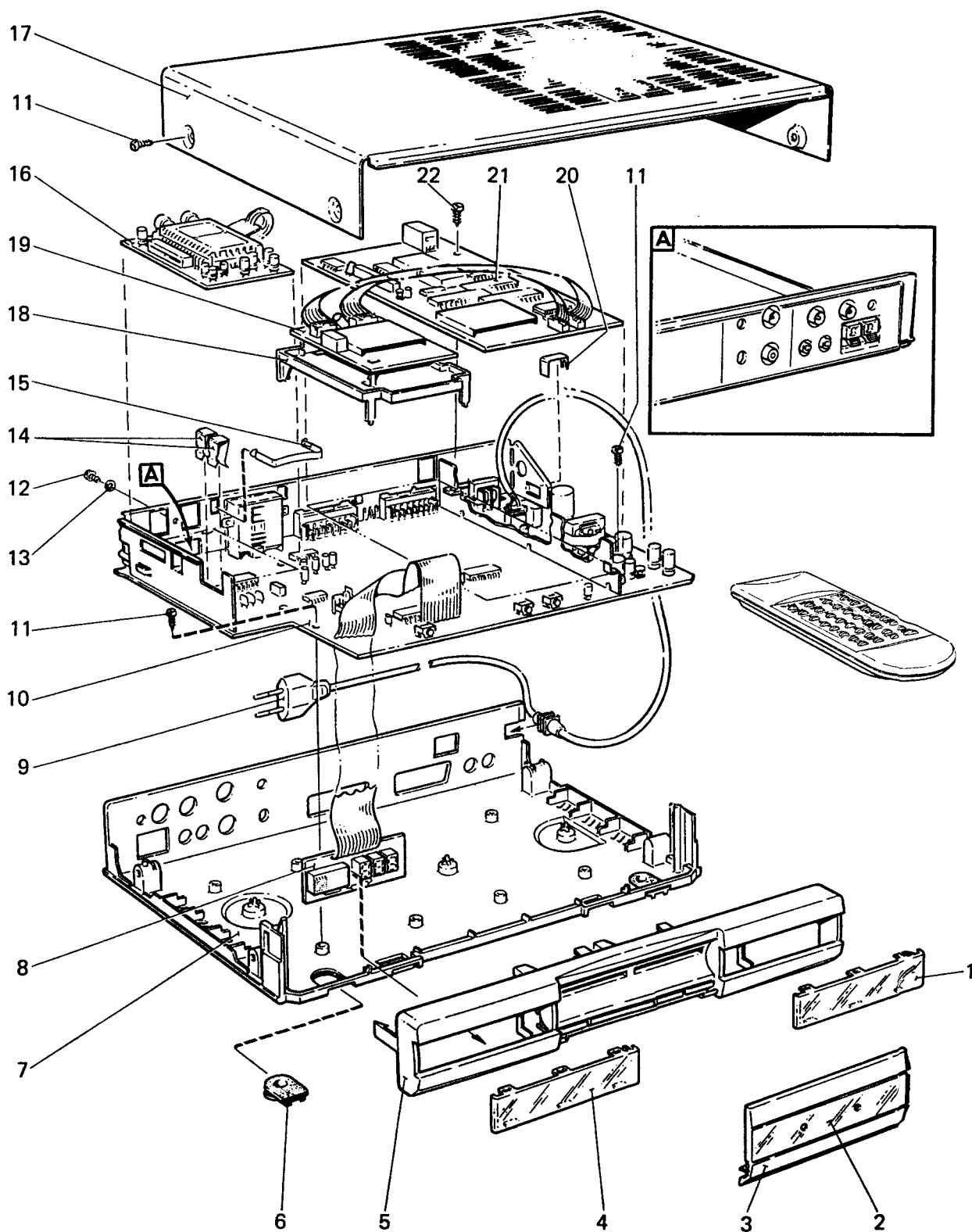
The following types of case are used for transistors.

Transistoren

Die folgenden Gehäusearten werden für Transistoren verwendet.

SOT-23	SOT-23	TO-92	TO-92	TO-220 (IS)	TO-220 (IS)
BC 847B: TA31, TA62-63, TB63-64, TB67-68, TC03, TC05, TC20, TC51, TC81-82, TC92, TC94, TE17-19, TE71, TE81, TF31-35, TF81, TM01-03, TM05-08, TM08, TM10-11, TM14, TP02-03, TP08, TP09, TP14, TS01, TT05, TT07-09, T1, T3 BC 807-25: TC21-23	BC 857B: TB62, TB69-70, TB81, TC04, TC52, TC85, TC91, TC95, TE72, TF82, TM13, TP01, TP05, TP11-12, TT01-04, TT08, T2 BC 817-25: TC11 BSR16: TM07 BF799: TM04	2N7002: TM12 BC 327-25: (Not SMD) TP08 BC 337-25: TP10, TP13	BC 369: (Not SMD) TC93, TP07 BC 636-10: (Not SMD) TP08	2SK1118: (Not SMD) TP04 2SB 1375: (Not SMD) TE85-88	

Satellite Receiver 5928 / SAT 2202 CS

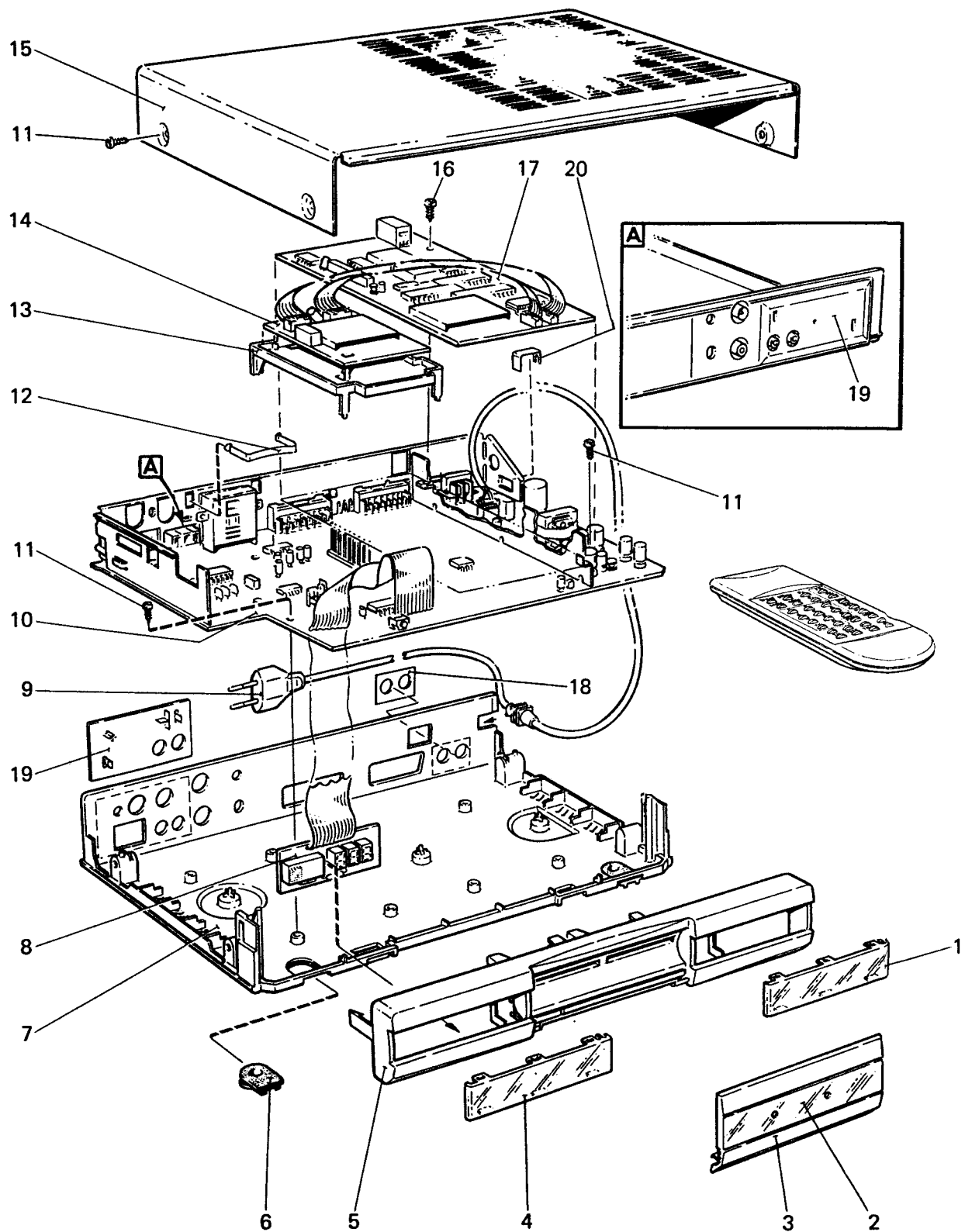


Satellite Receiver 5928 / SAT 2202 CS

Pos.	Part No.	Description
1	53 20151-10	Displaywindow SAT2202CS
	53 20151-11	Displaywindow MAC IV CS
2	41 70098-01	Luxor brand
	41 70100-01	Salora brand
	41 70102-01	Nokia brand
3	53 31108-01	Lid
4	53 20151-01	Displaywindow
5	53 20213-01	Frontpanel compl.
6	53 00240-01	Foot
7	53 31106-01	Bottom
8	55 31744-01	Panel module
9	43 50100-01	Mains cable
	43 50107-01	Mains cable UK
10	55 31741-24	P.C. board Until 9308
	55 31741-25	P.C. board From 9309
	55 31741-54	P.C. board UK Until 9308
	55 31741-55	P.C. board UK From 9309
11	51 15035-07	Screw PT-K 35x10 Torx
12	51 15040-10	Screw RTK 2,9 x 4,5
13	49 11474-10	Washer AZ 3,2
14	44 90055-01	Clips
15	63 80084-01	Modulator support
16	55 31755-02	Tuner module Until 9233
	55 31755-03	Tuner module From 9234
	55 31751-02	Tuner module Alternative
17	44 21206-06	Cover
18	53 31200-01	Twin card support
19	55 31752-03	Twin card module
20	44 21199-01	Earth tin-plate
21	55 31743-05	Transcoder module Until 9308
	55 31743-06	Transcoder module From 9309
22	51 15016-10	Screw RTS B6 3,5 x 9,5

Pos.	Part No.	Description
Bypacked		
-	43 40317-01	Cable RF 1,5 m
-	43 40262-01	Connector coaxial, female
-	66 75928-12	Owners Manual S,DK,N,SF
-	66 75928-14	Owners Manual GB, D, F, I, E
-	66 75928-04	Programme Guide
-	96 00229-01	Battery MN 1,5 V R03
-	262 5808-11	Remote control unit Luxor
-	262 5808-21	Remote control unit Salora
-	262 5808-61	Remote control unit Nokia
No serviceable parts		
When ordering		
Please, always state Part No. description, model and series.		

Decoder 5918 / 3002 CS / SD 5710



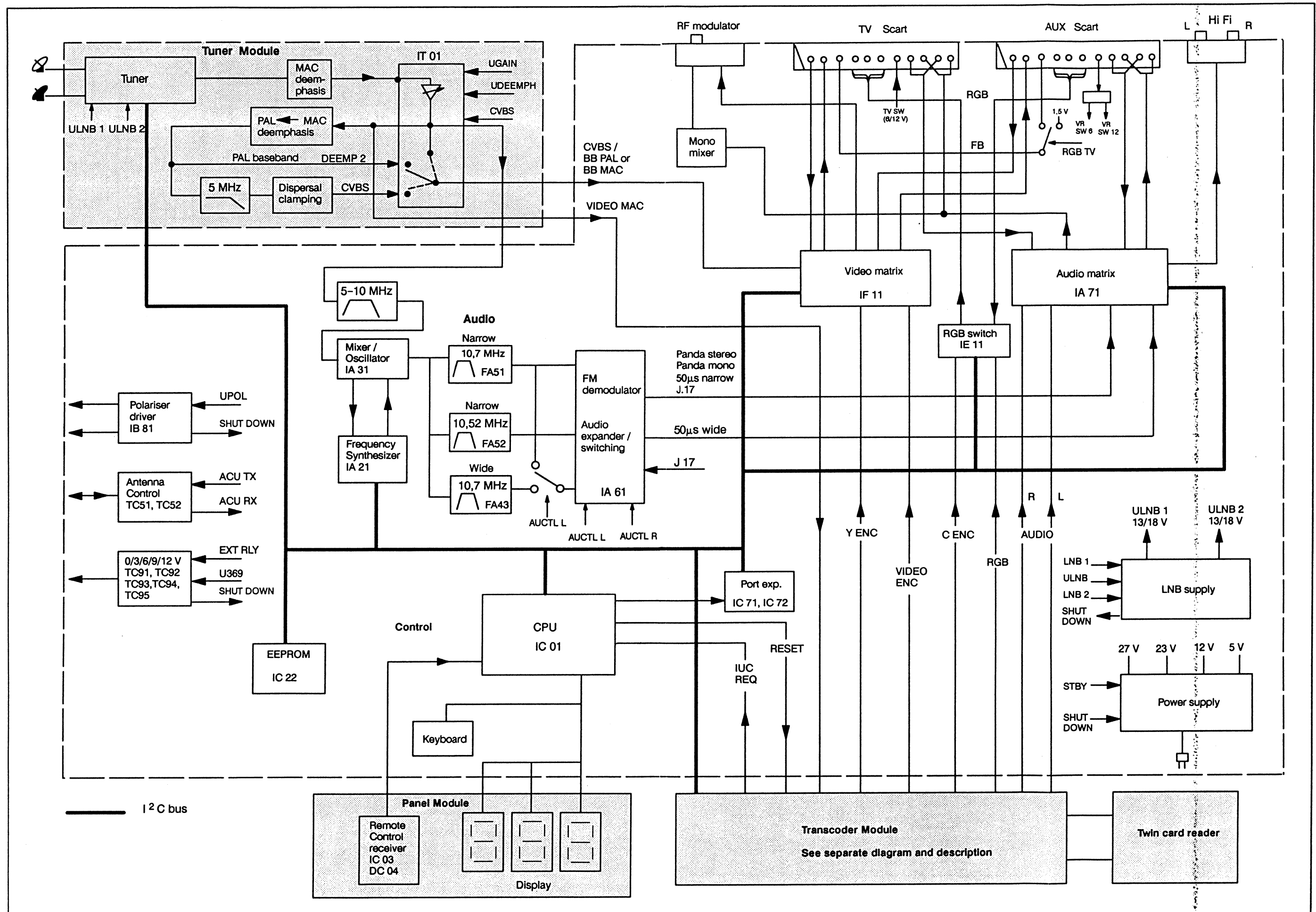
Decoder 5918 / 3002 CS / SD 5710

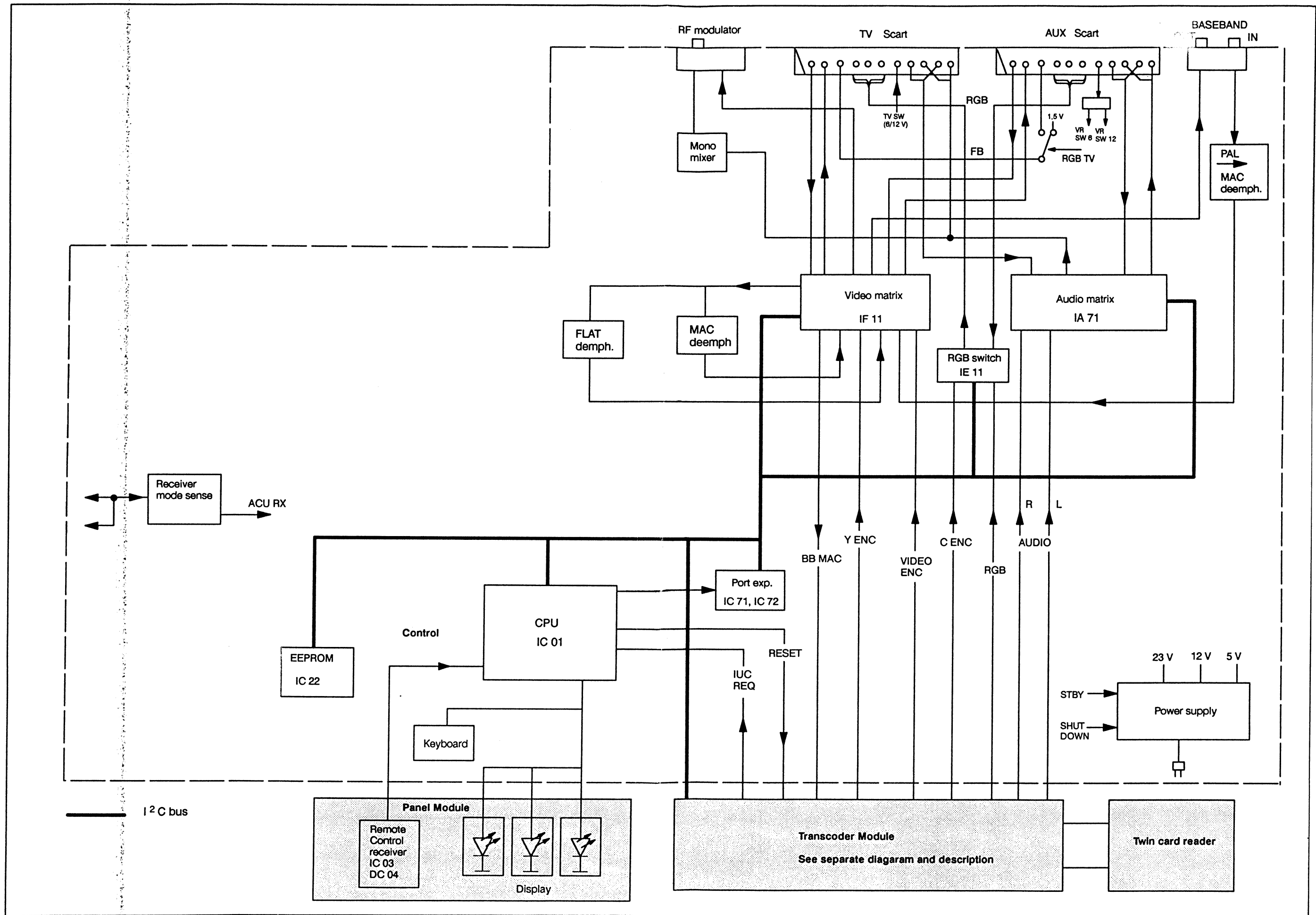
Pos.	Part No.	Description
1	53 20151-15	Displaywindow 3002 CS
	53 20151-16	Displaywindow 5918 CS
	53 20151-22	Displaywindow SD5710
2	41 70098-01	Luxor brand
	41 70100-01	Salora brand
	41 70102-01	Nokia brand
	41 70122-01	Finlux brand
3	53 31108-01	Lid
4	53 20151-01	Displaywindow
5	53 20211-01	Frontpanel compl.
6	53 00240-01	Foot
7	53 31106-01	Bottom
8	55 31744-02	Panel module
9	43 50100-01	Mains cable
	43 50107-01	Mains cable UK
10	55 31741-44	P.C. board Until 9308
	55 31741-45	P.C. board From 9309
	55 31741-64	P.C. board Until 9308
	55 31741-65	P.C. board From 9309
11	51 15035-07	Screw PT-K 35x10 Torx
12	63 80084-01	Modulator support
13	53 31200-01	Twin card support
14	55 31752-03	Twin card module
15	44 21206-06	Cover
16	51 15016-10	Screw RTS B6 3,5 x 9,5
17	55 31743-15	Transcoder module Until 9302
	55 31743-16	Transcoder module From 9303
18	53 00244-10	Cover plate
19	53 00242-01	Cover plate
20	44 21199-01	Earth tin-plate

Pos.	Part No.	Description
Bypacked		
-	43 40317-01	Cable RF 1,5 m
-	43 40262-01	Connector coaxial, female
-	66 75918-12	Owners Manual S,DK,N,SF
-	66 75918-13	Owners Manual GB, D, F, I, E
-	96 00229-01	Battery MN 1,5 V R03
-	262 5808-01	Remote control unit Neutral
-	262 5808-11	Remote control unit Luxor
-	262 5808-21	Remote control unit Salora
-	262 5808-61	Remote control unit Nokia
No serviceable parts		
-	43 40291-01	Videocable 2 x RCA Plug x)
-	43 40438-01	Adapter, BNC P-RCA J x)
-	43 40474-01	Adapter, BNC J-BNC J x)
-	43 72194-01	Cable, Scart-3 x phono x)
-	44 21231-01	Plate x)
-	51 15017-07	Screw PT-K 35 x 16 Torx x)
x) = Cable-TV variant		
When ordering		
Please, always state Part No. description, model and series.		

Notes

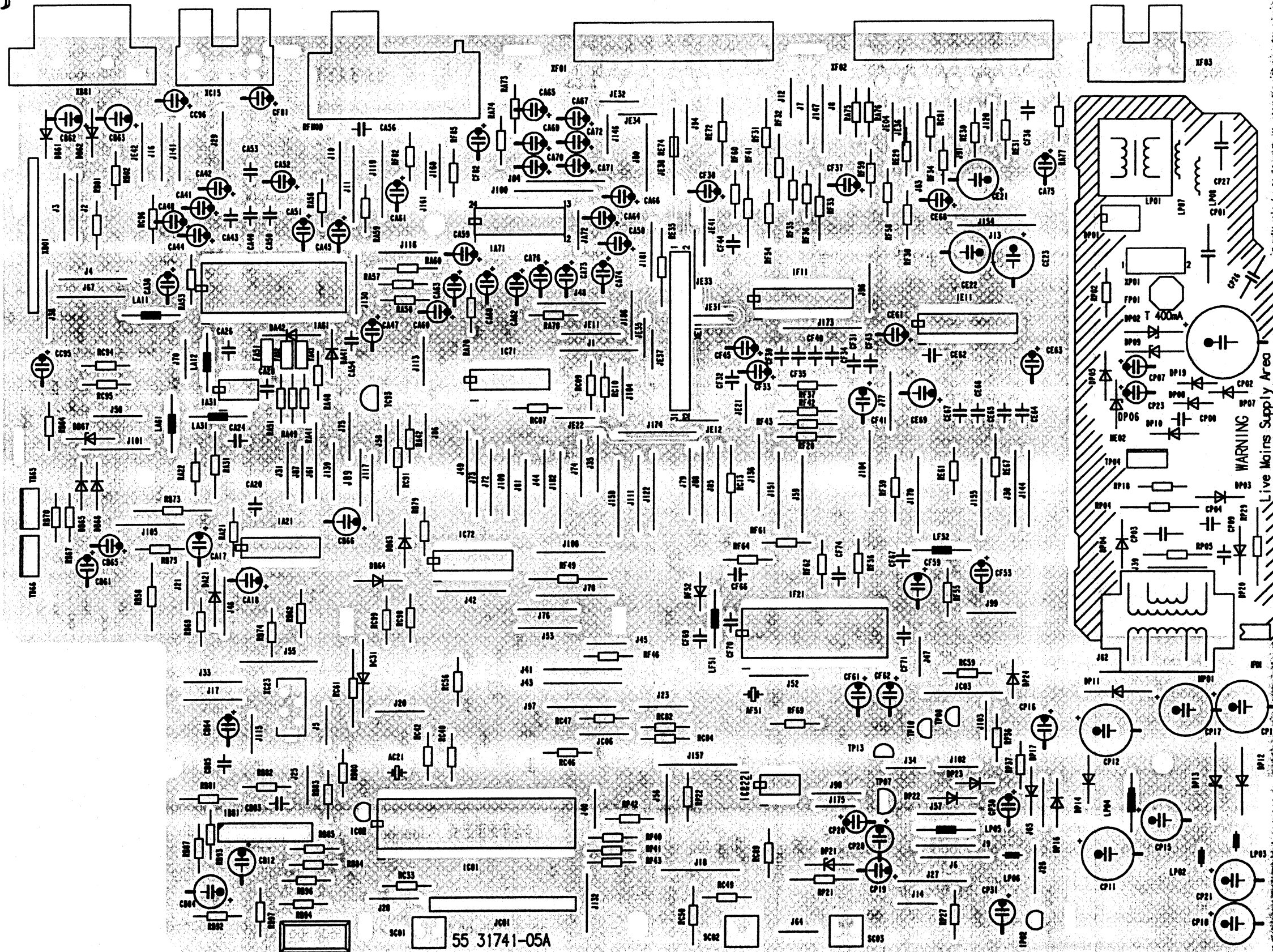
Notes:





Artikel Nr 55 31741-24, -25, -44, -45, -54, -55, -64, -65
Part No

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Spare Part List page
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WARNING
DO NOT
4 CP02
DP07
ive Mains Supply Area

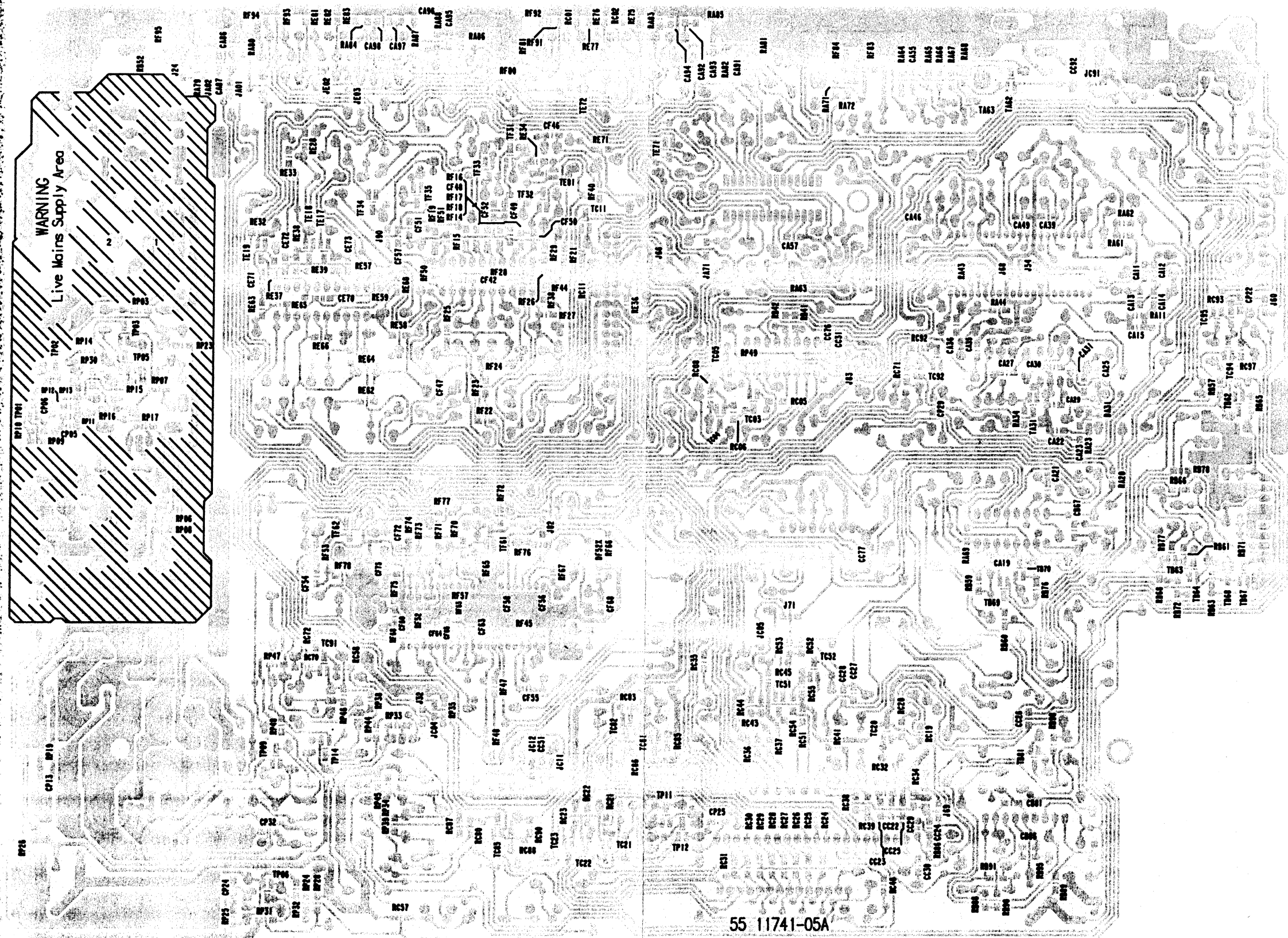
Bestückungsseite

Satellite Receiver 5928 / SAT 2202 CS, Decoder 5918 / 3002 CS / SD 5710:

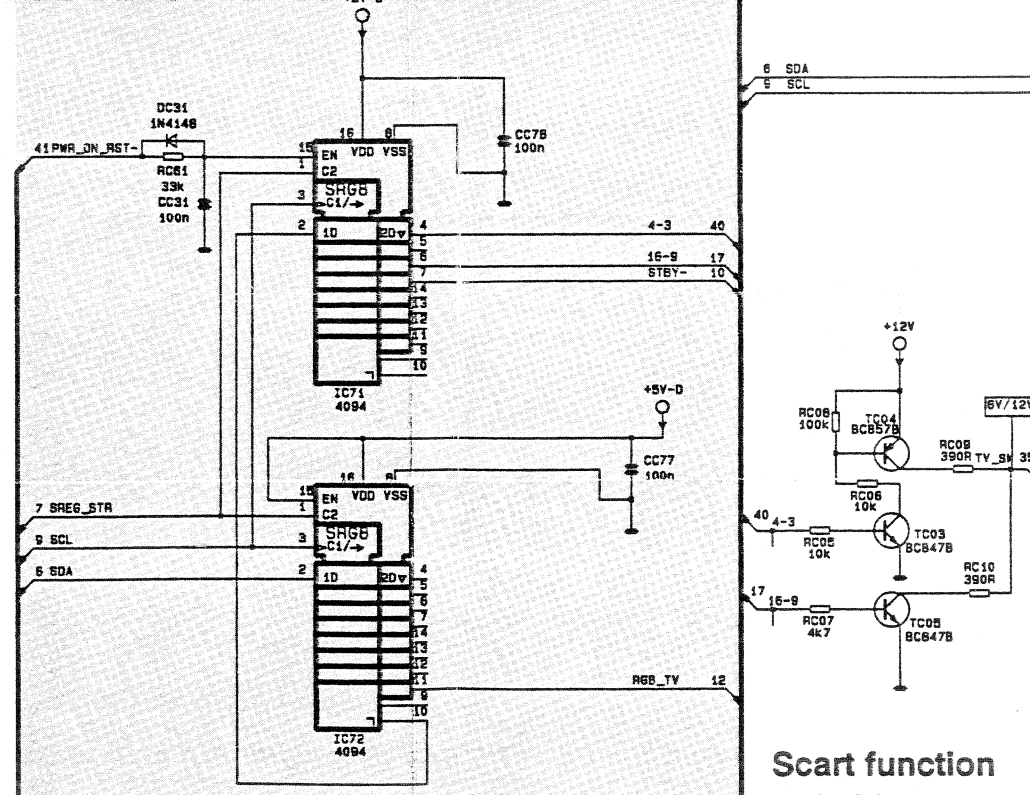
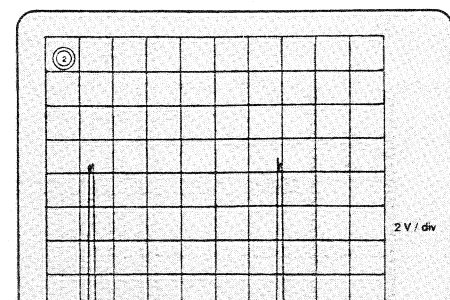
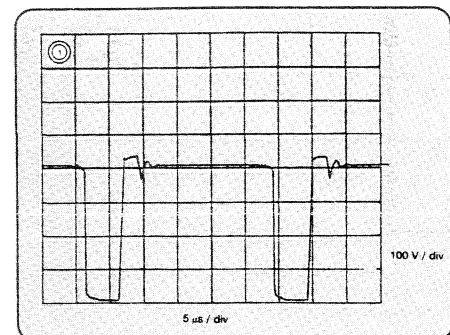
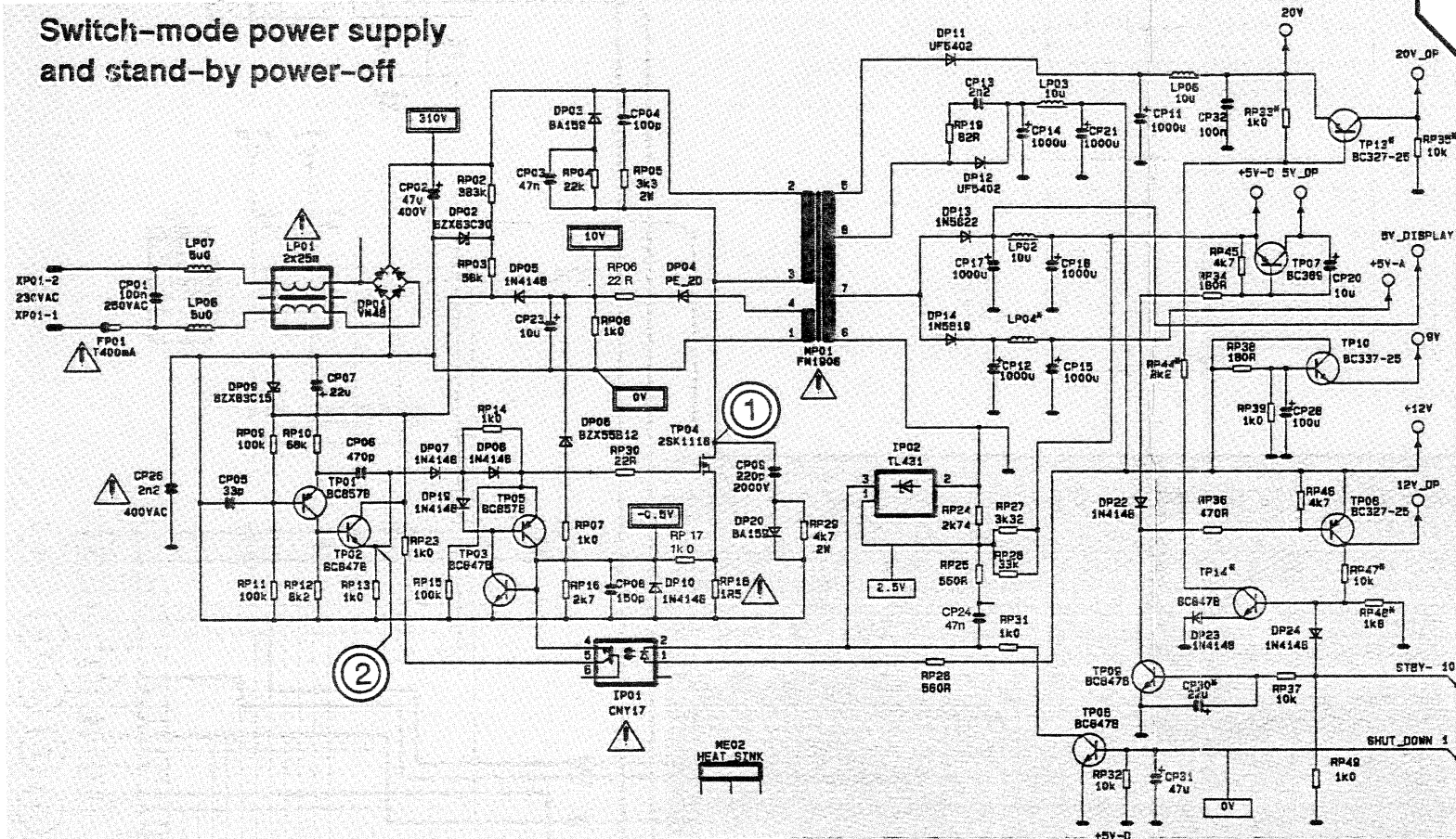
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29 - 32

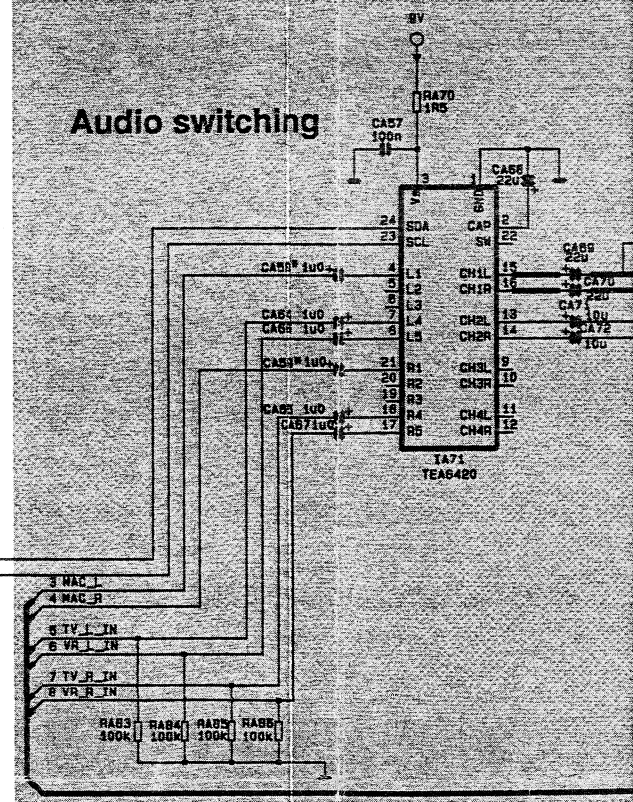


Switch-mode power supply and stand-by power-off

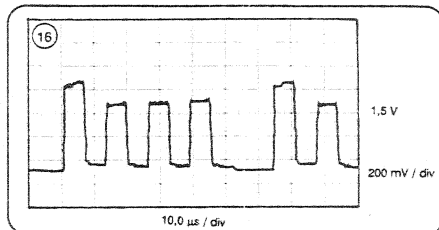
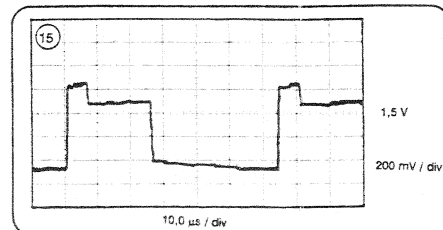
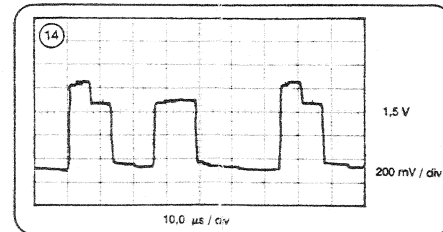
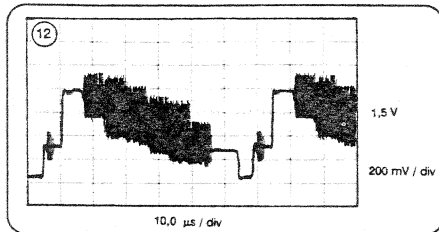
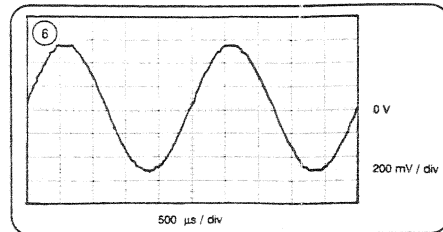
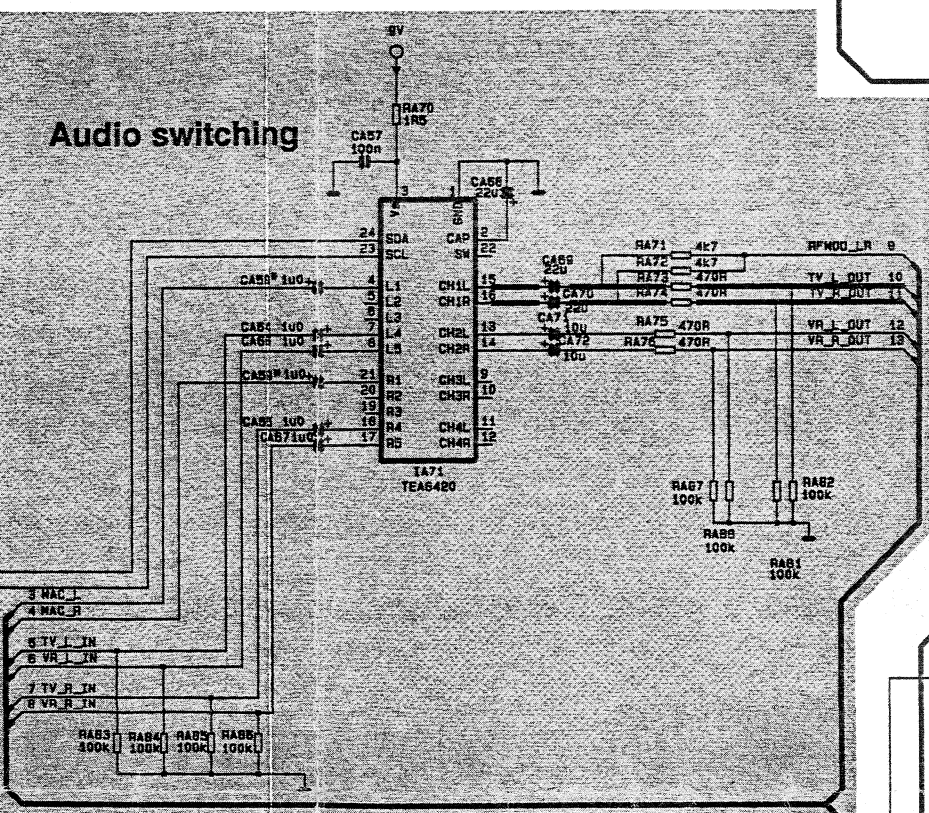


Scart function

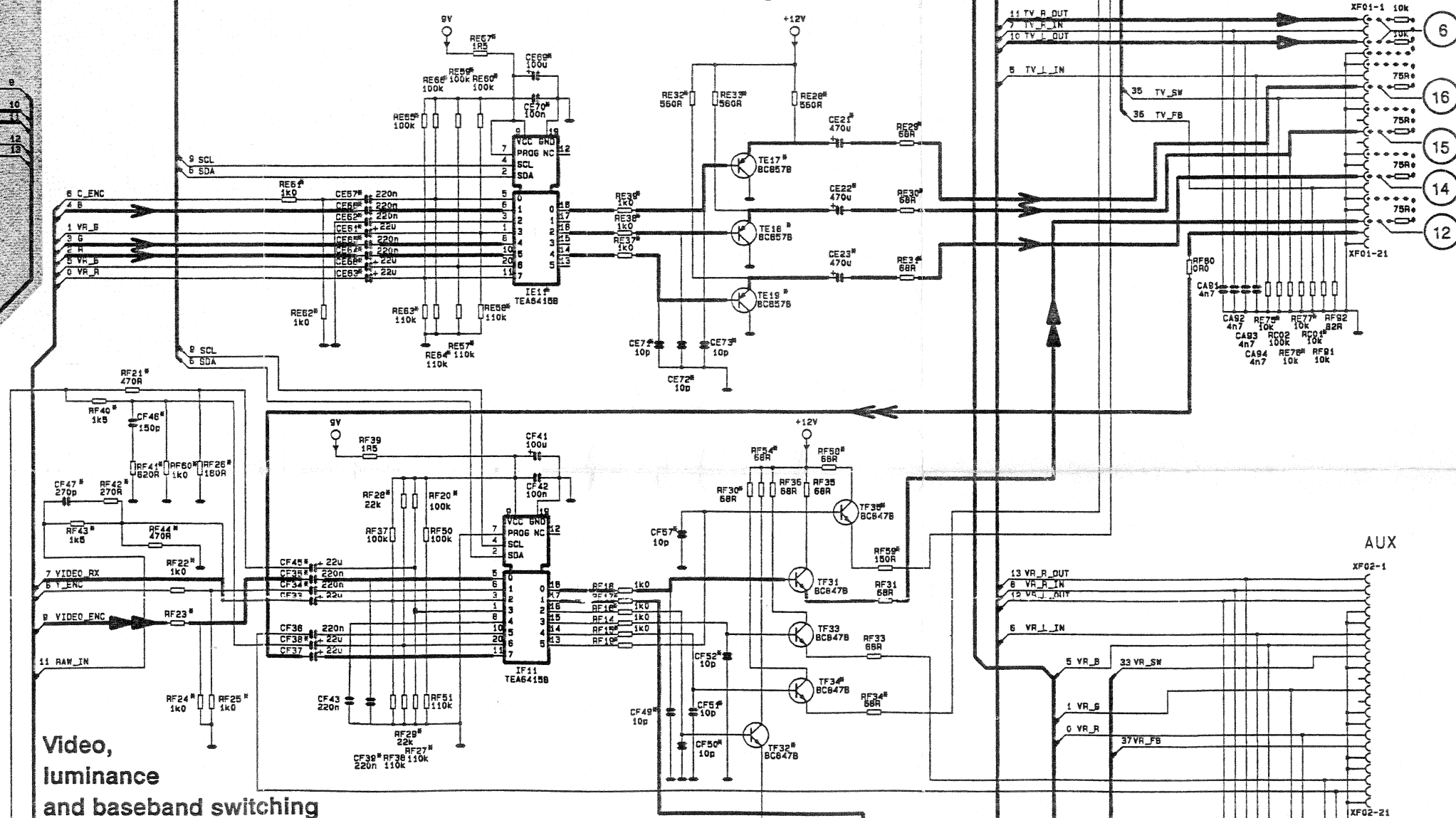
Audio switching



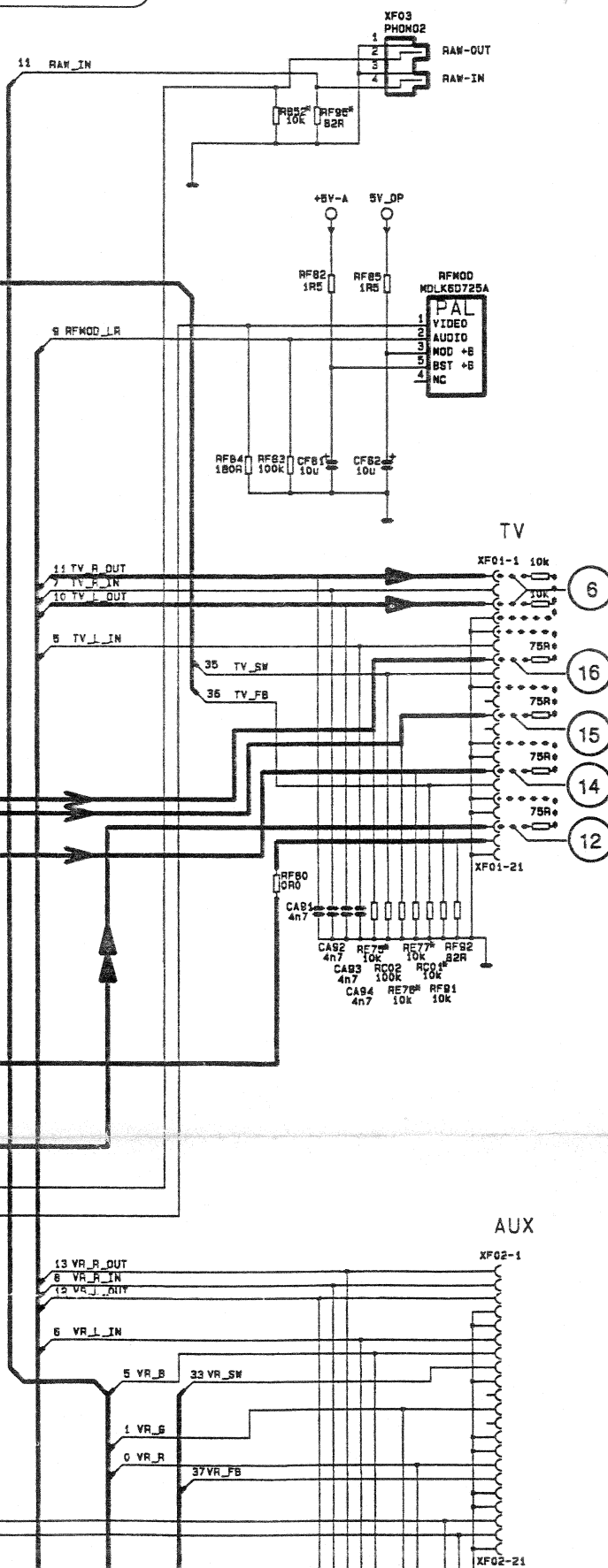
Audio switching

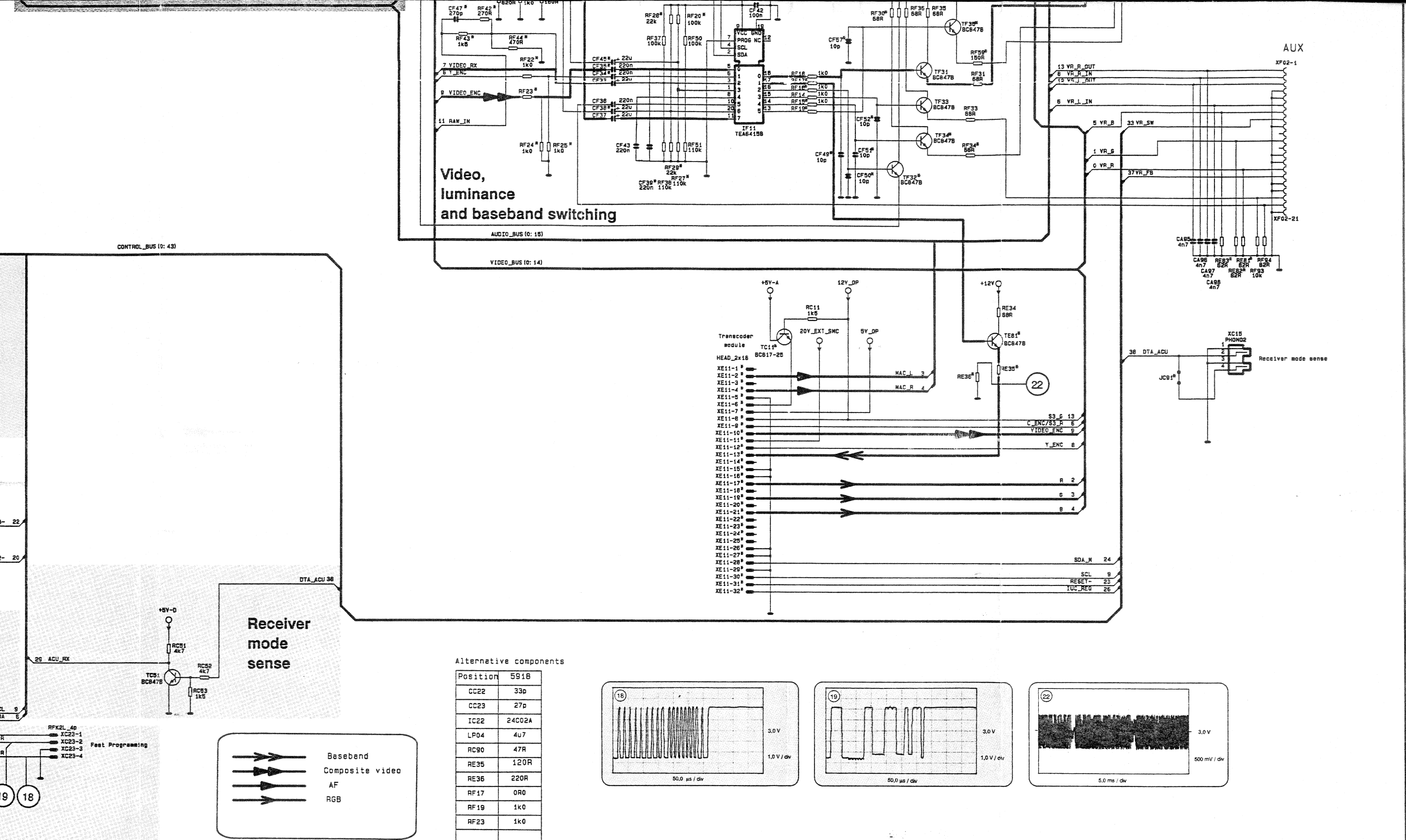


RGB and chroma switching



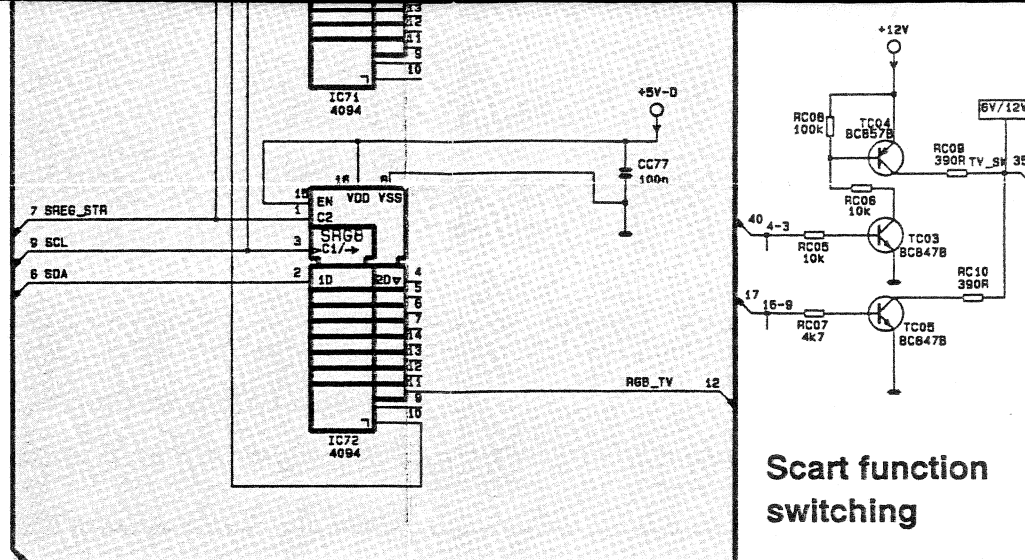
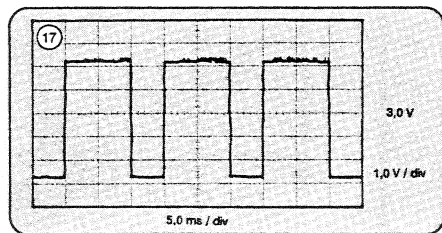
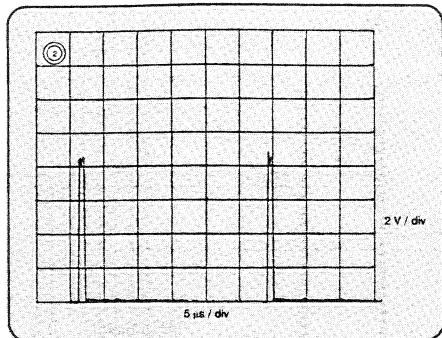
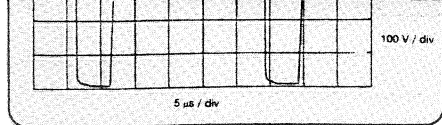
Video, luminance and baseband switching





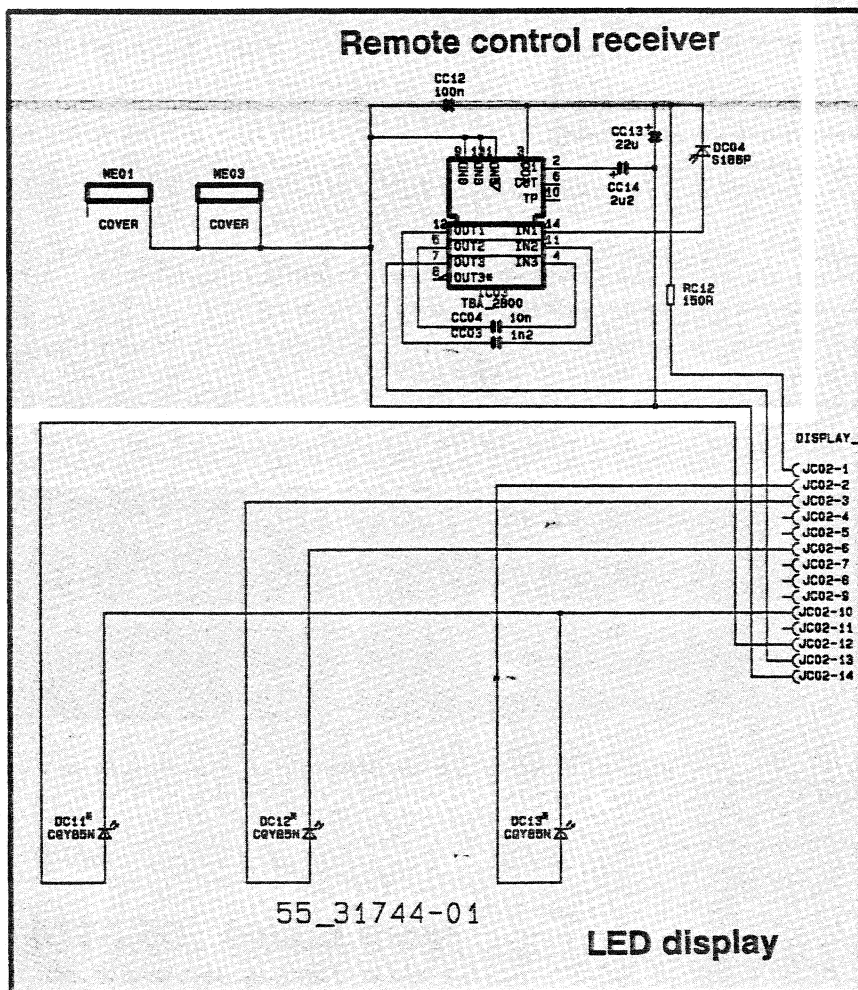
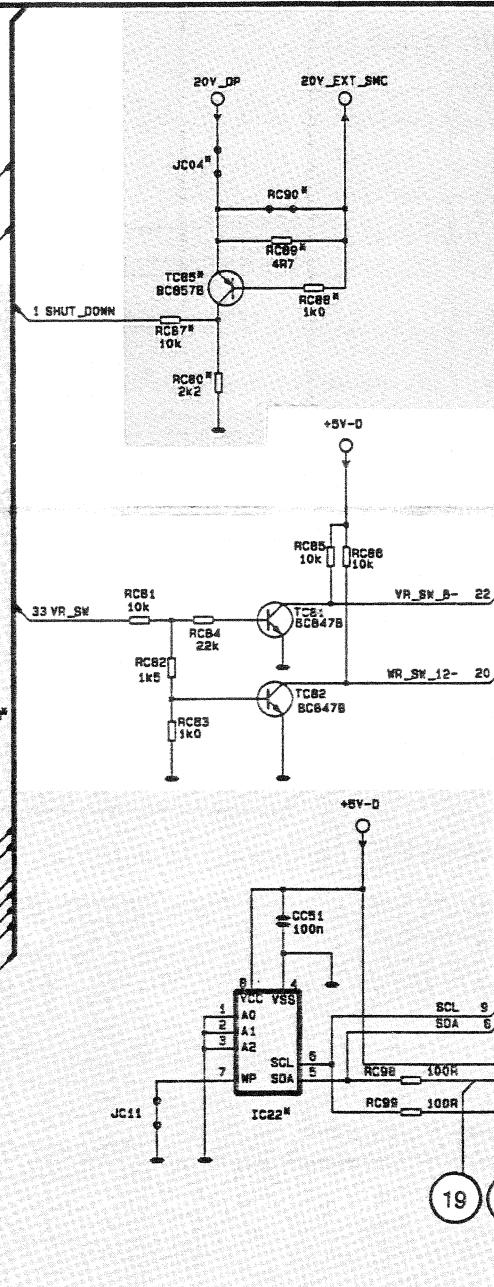
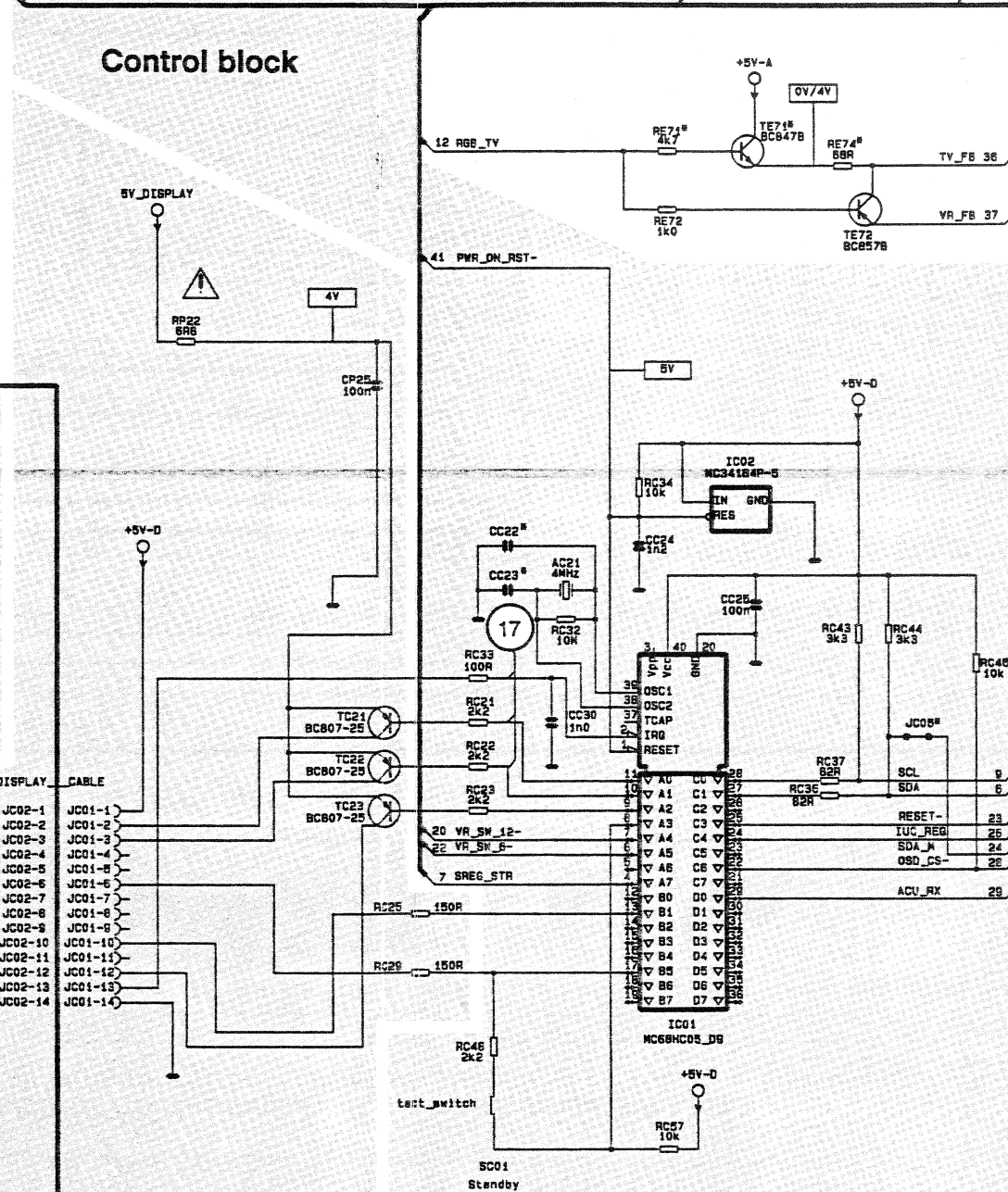
* = OPTION

Main Board 55 31741-05
5918 / 3002 CS / SD 5710

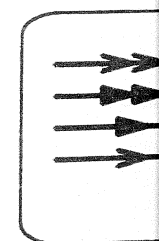


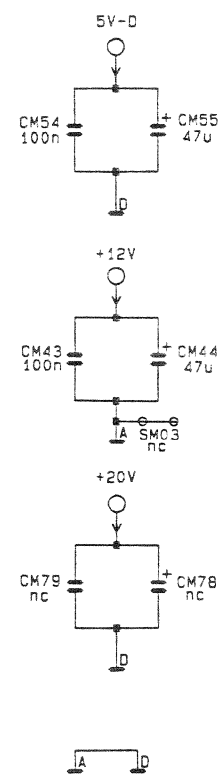
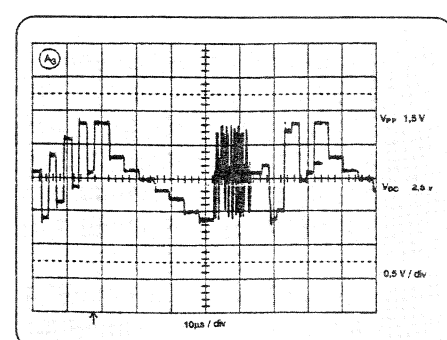
CONTROL_BUS (0: 43)

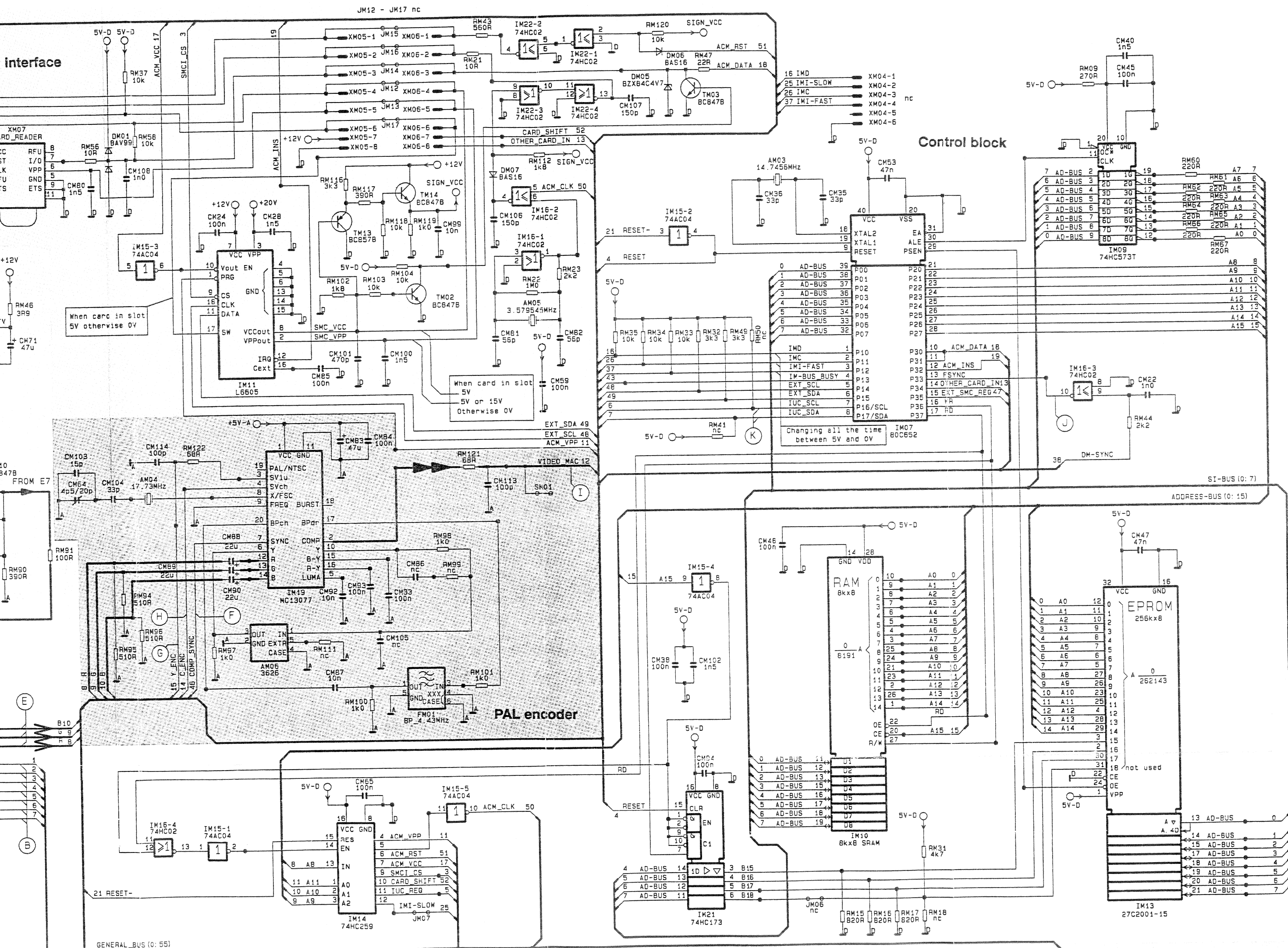
Control block



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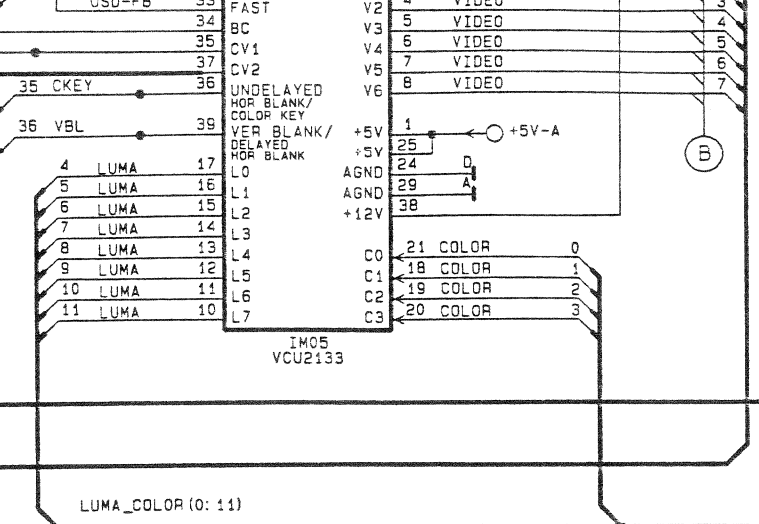
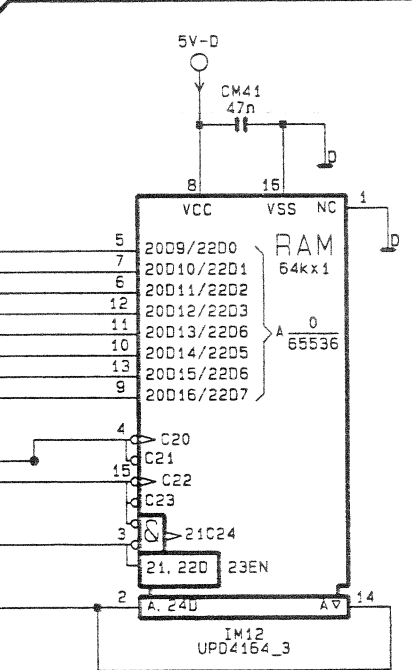
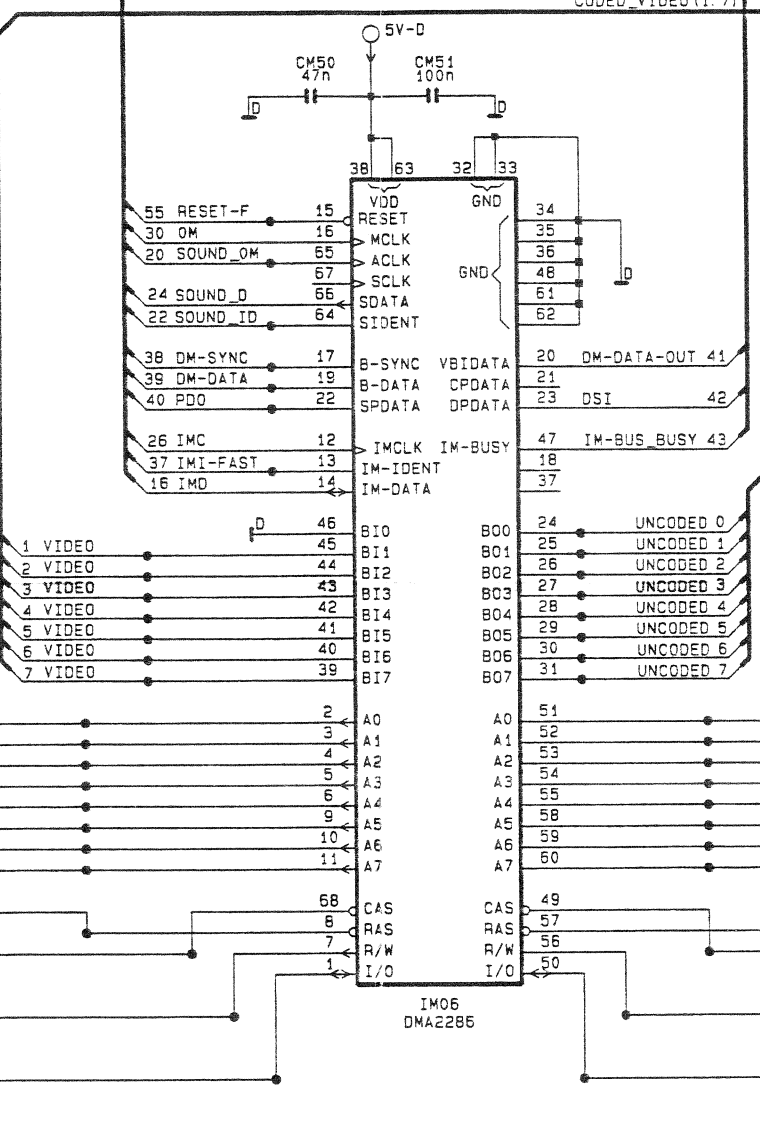
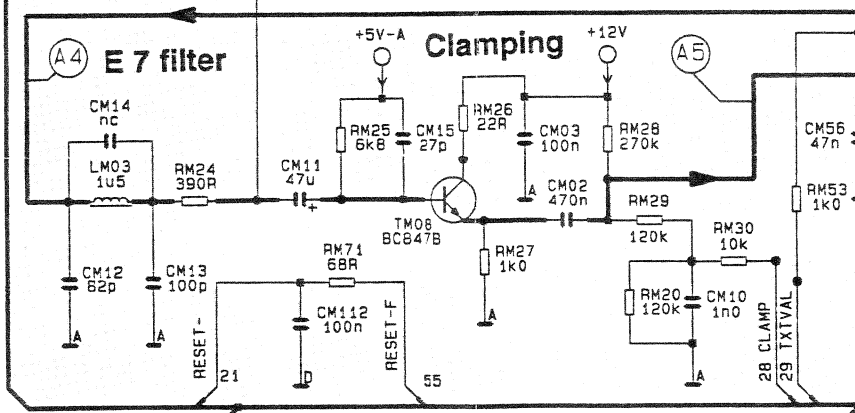
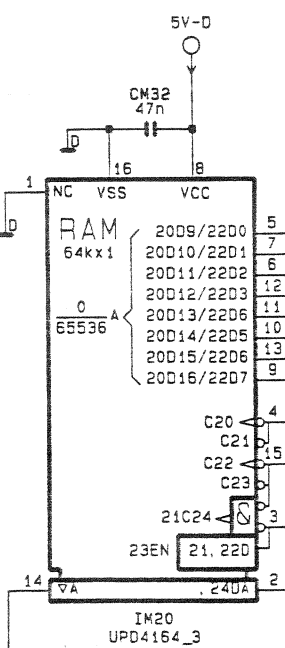
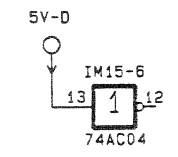
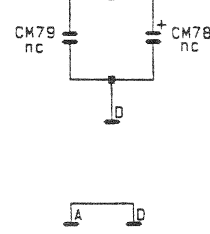
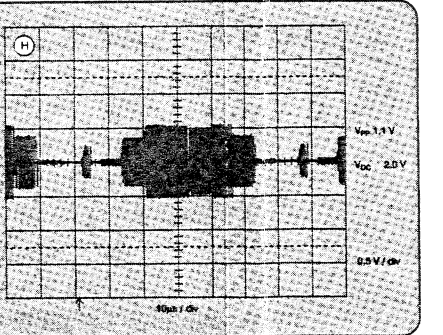
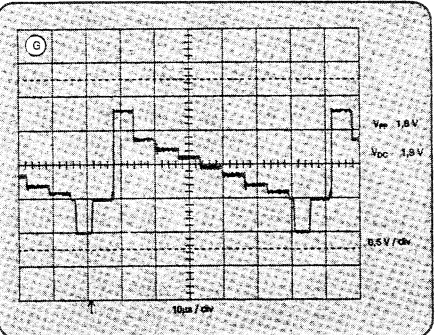
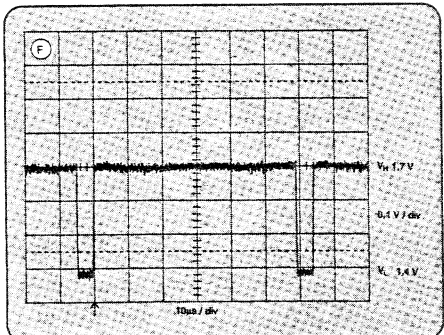
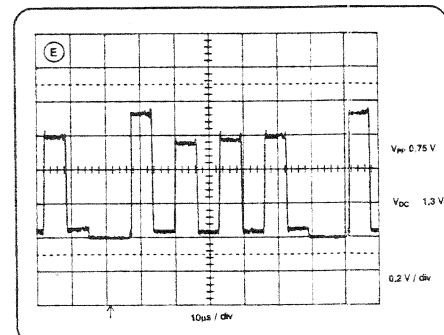
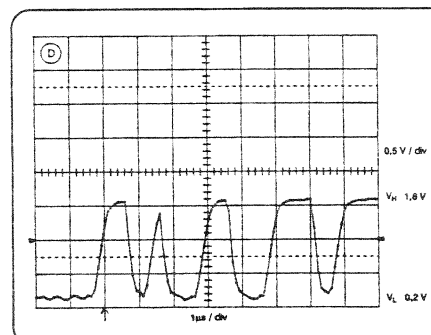
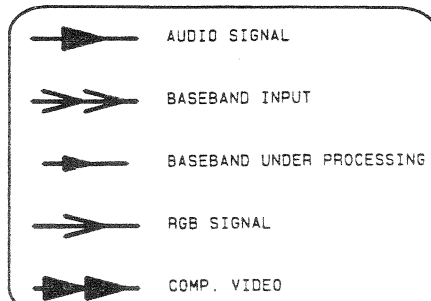
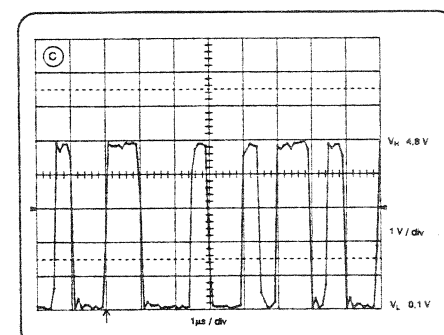
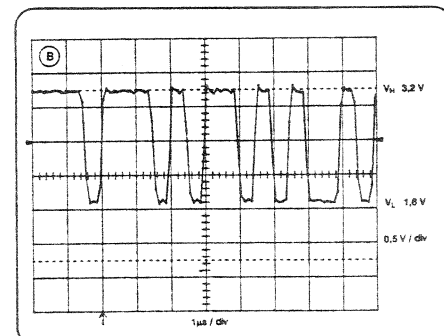
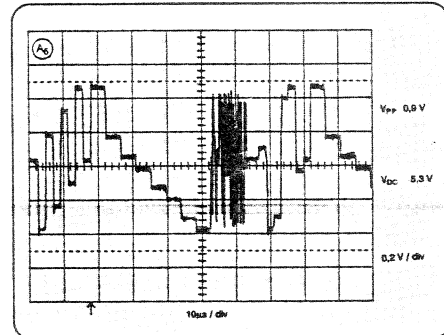
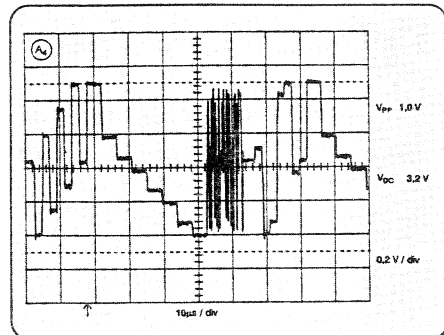
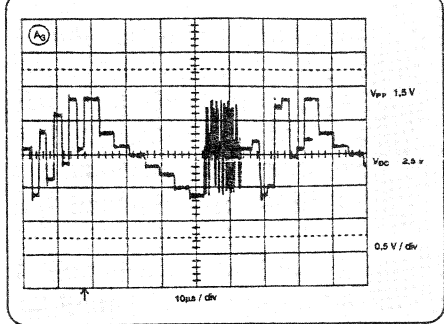


Interface

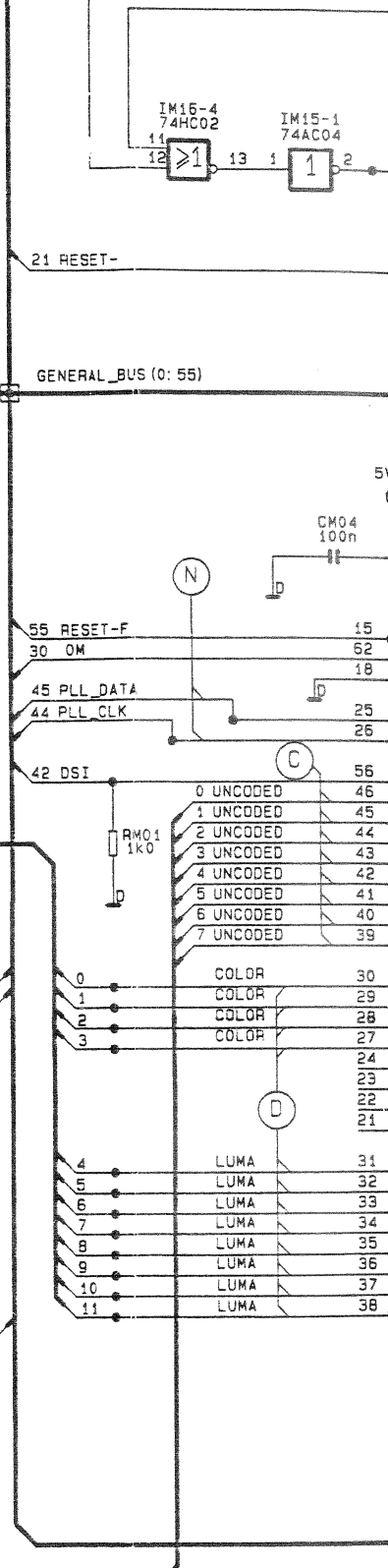
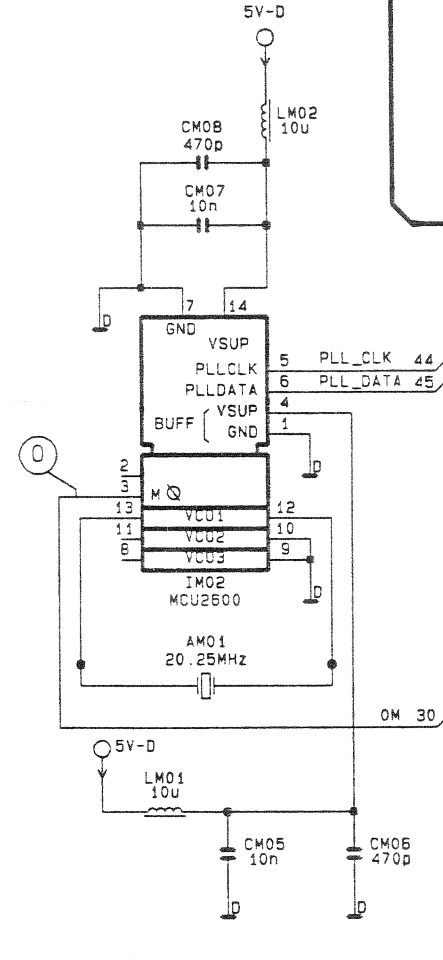
Control block

PAL encoder

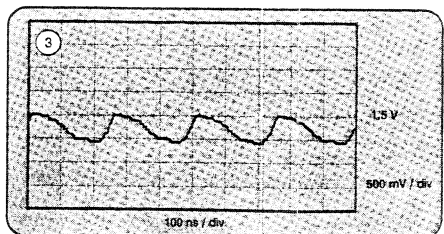
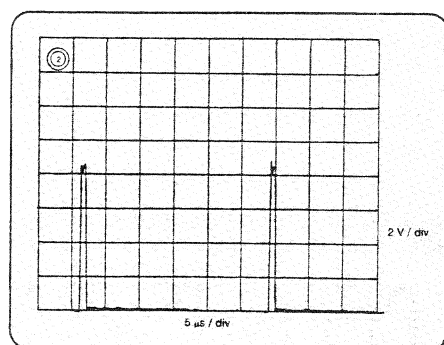
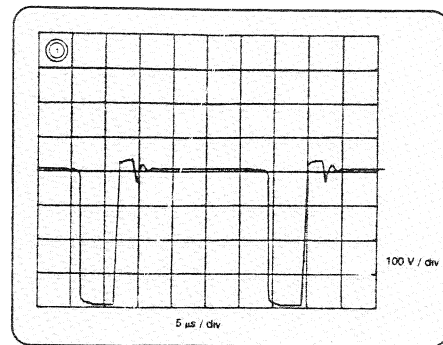
GENERAL_BUS (0: 55)



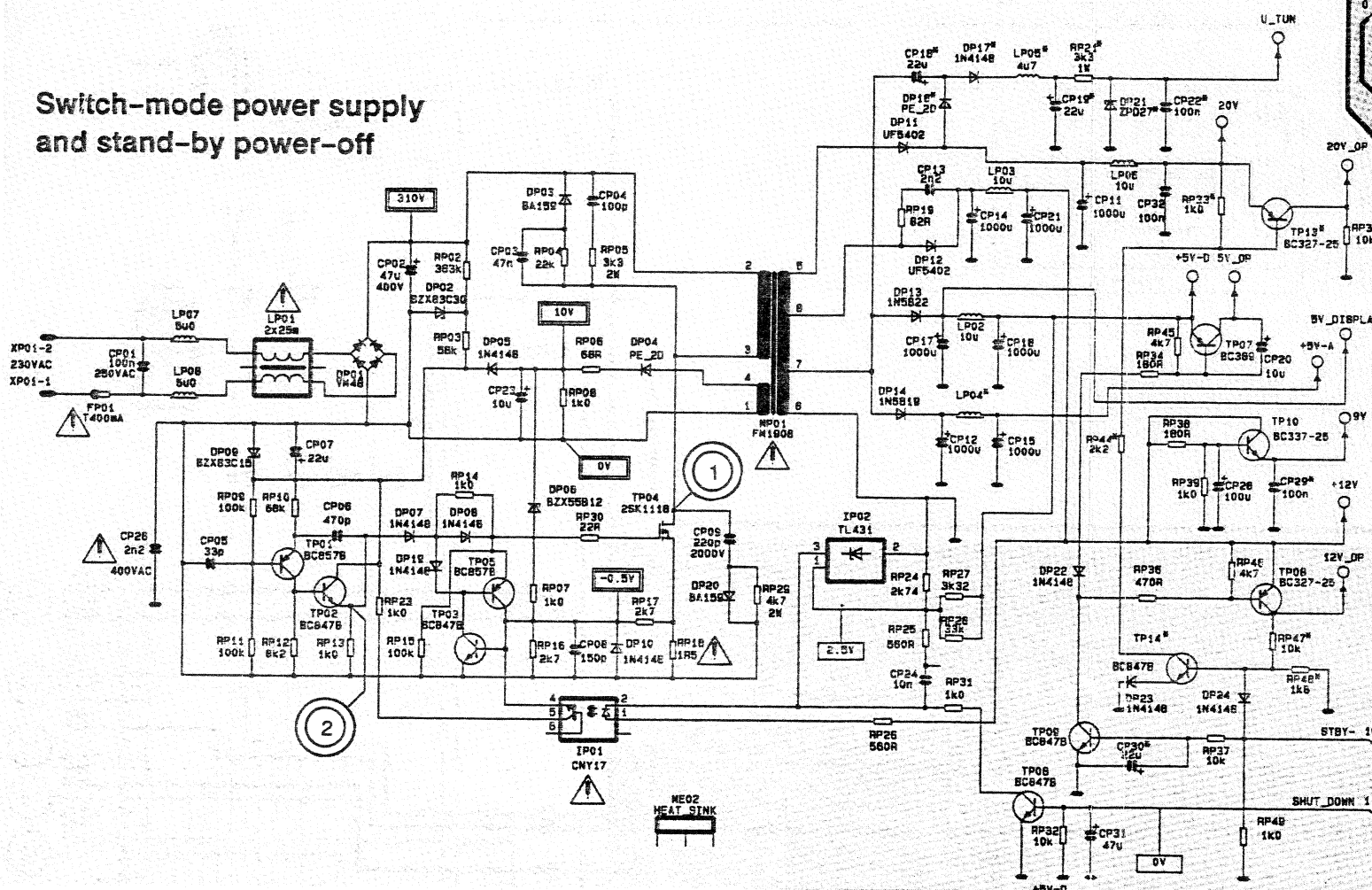
MAC processing



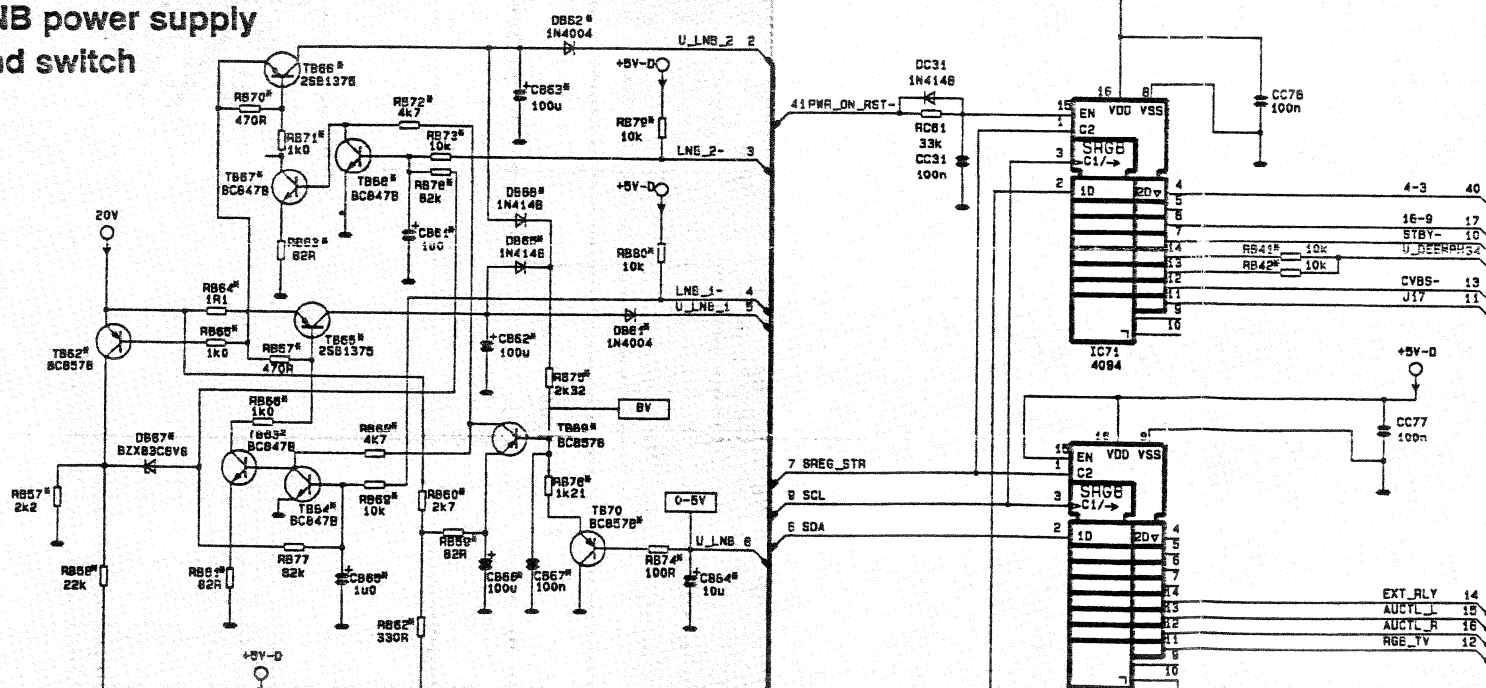
nc = not connected or not mounted



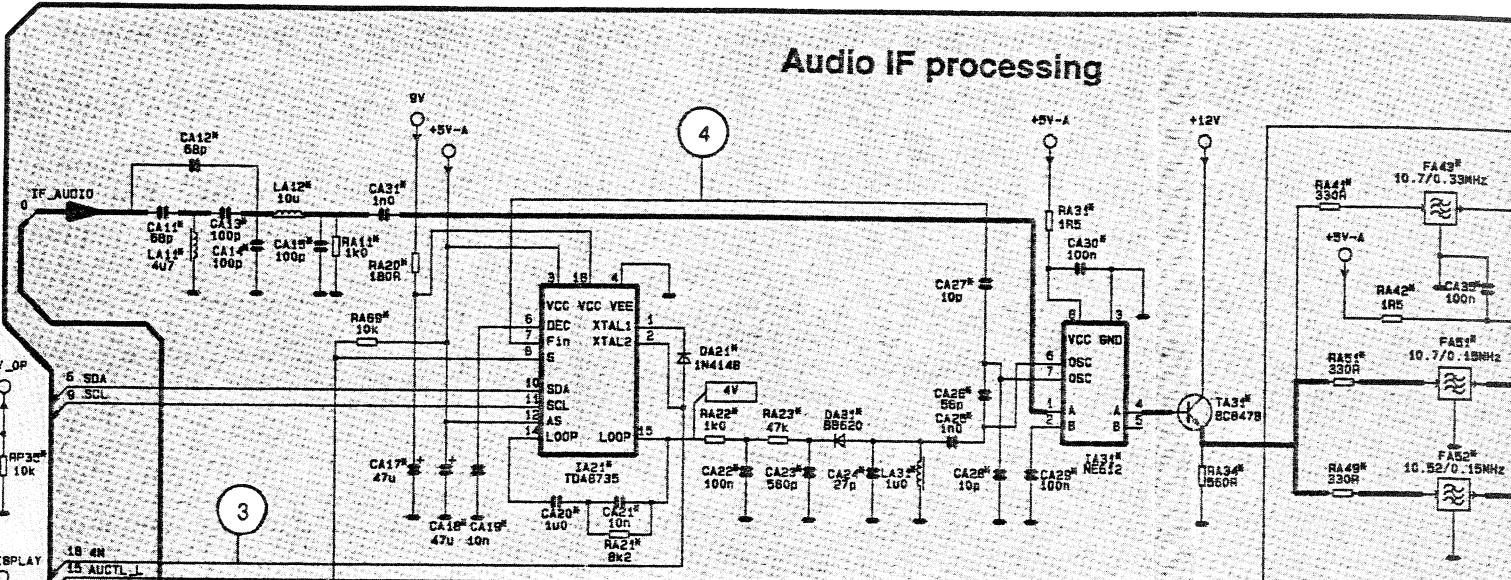
Switch-mode power supply and stand-by power-off



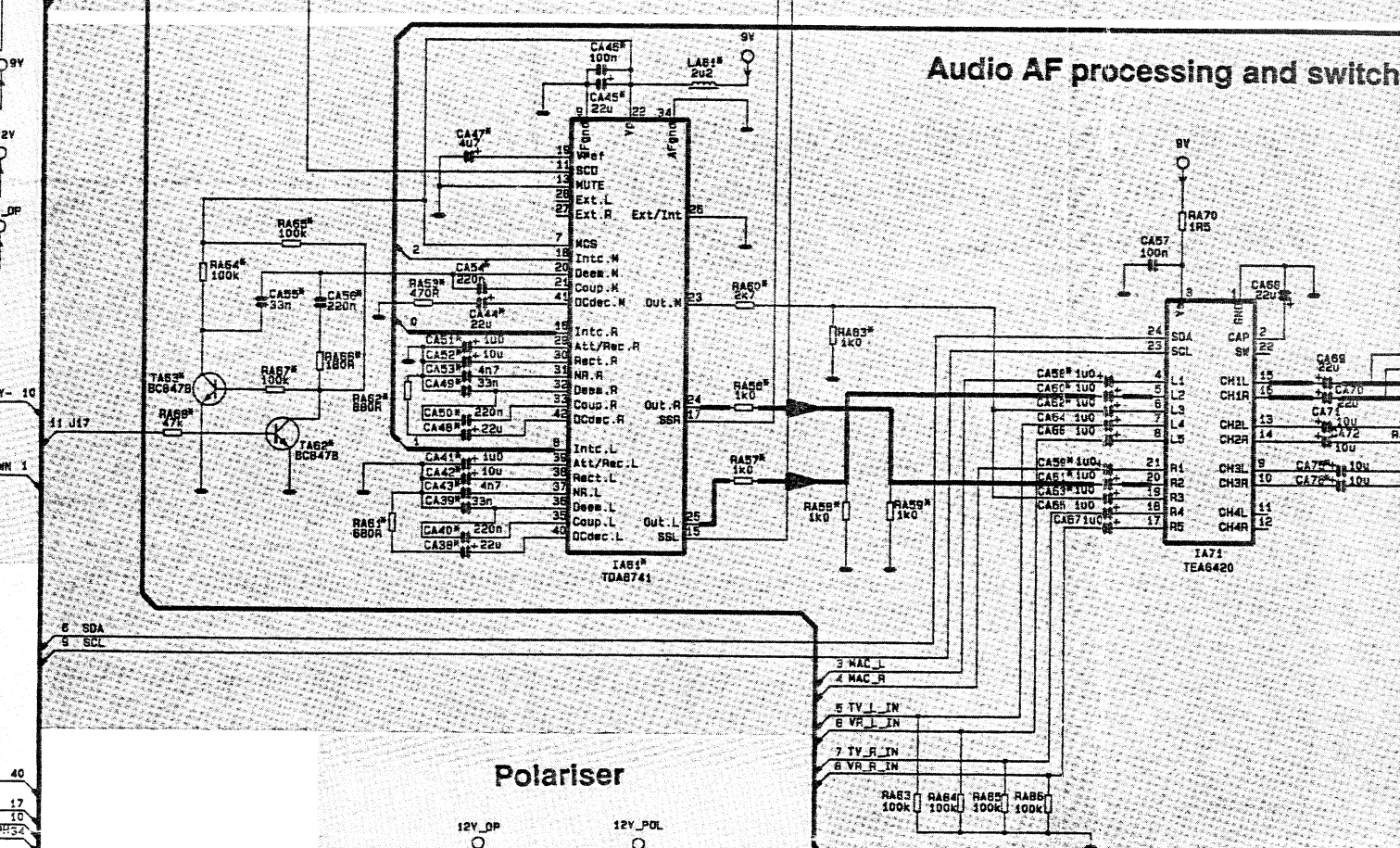
LNB power supply and switch



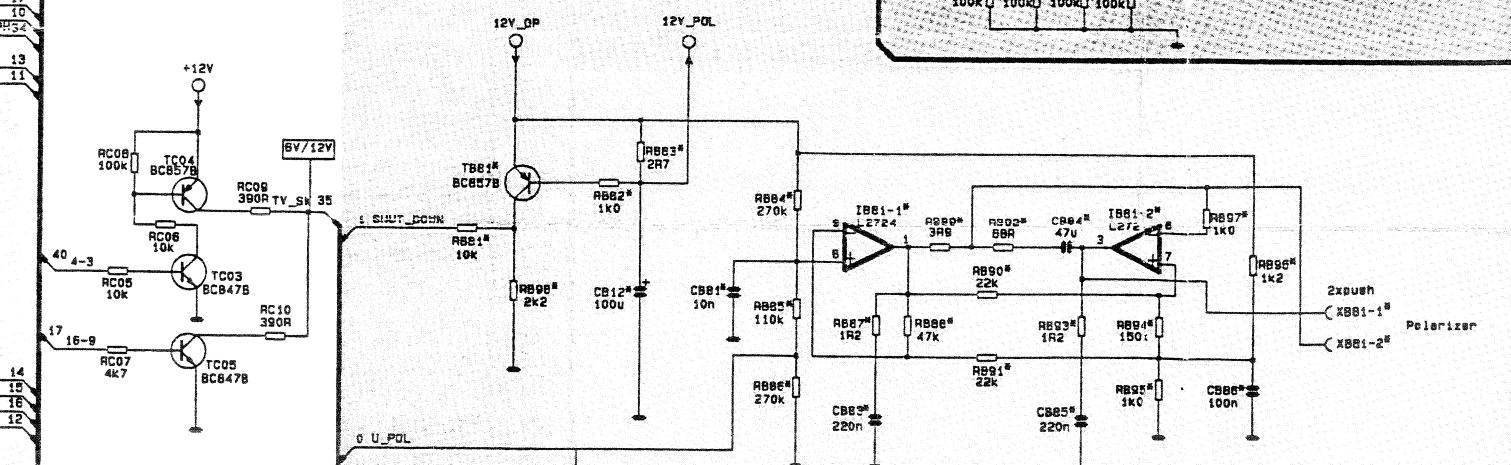
Audio IF processing



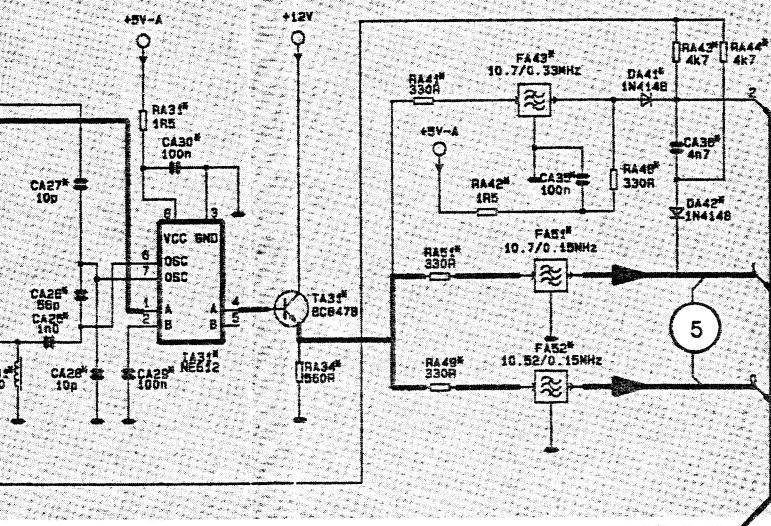
Audio AF processing and switch



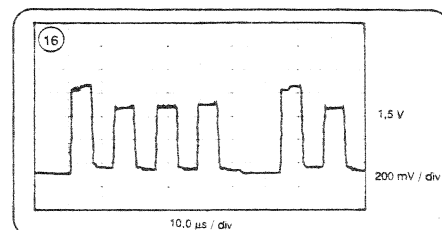
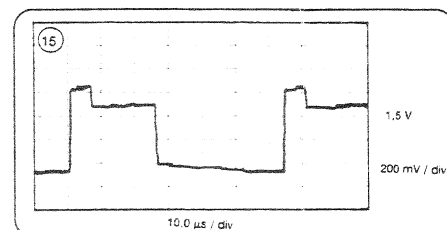
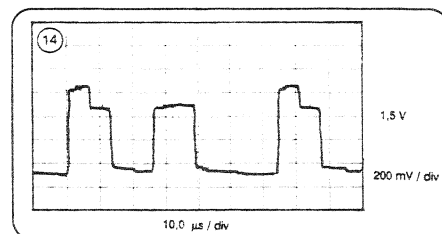
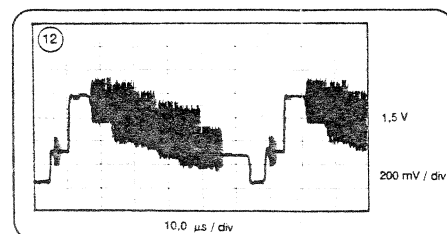
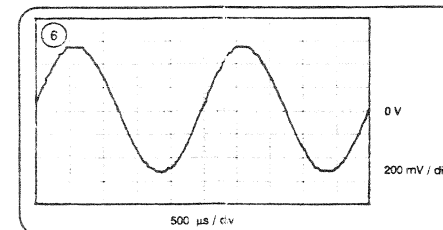
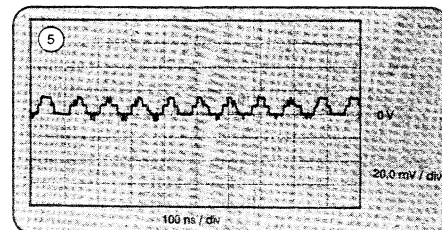
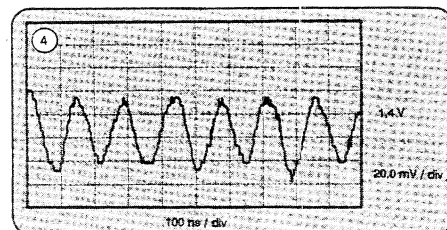
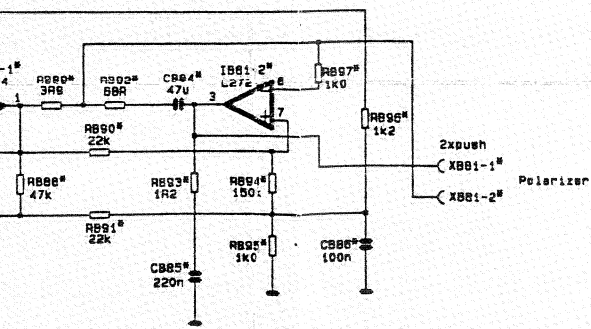
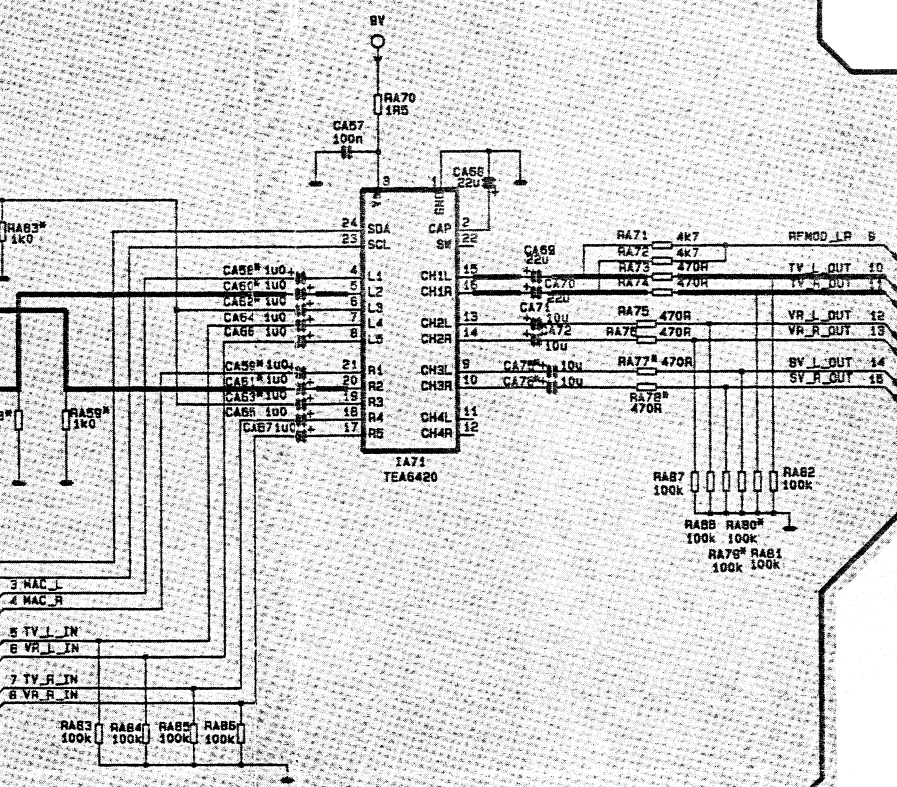
Polariser



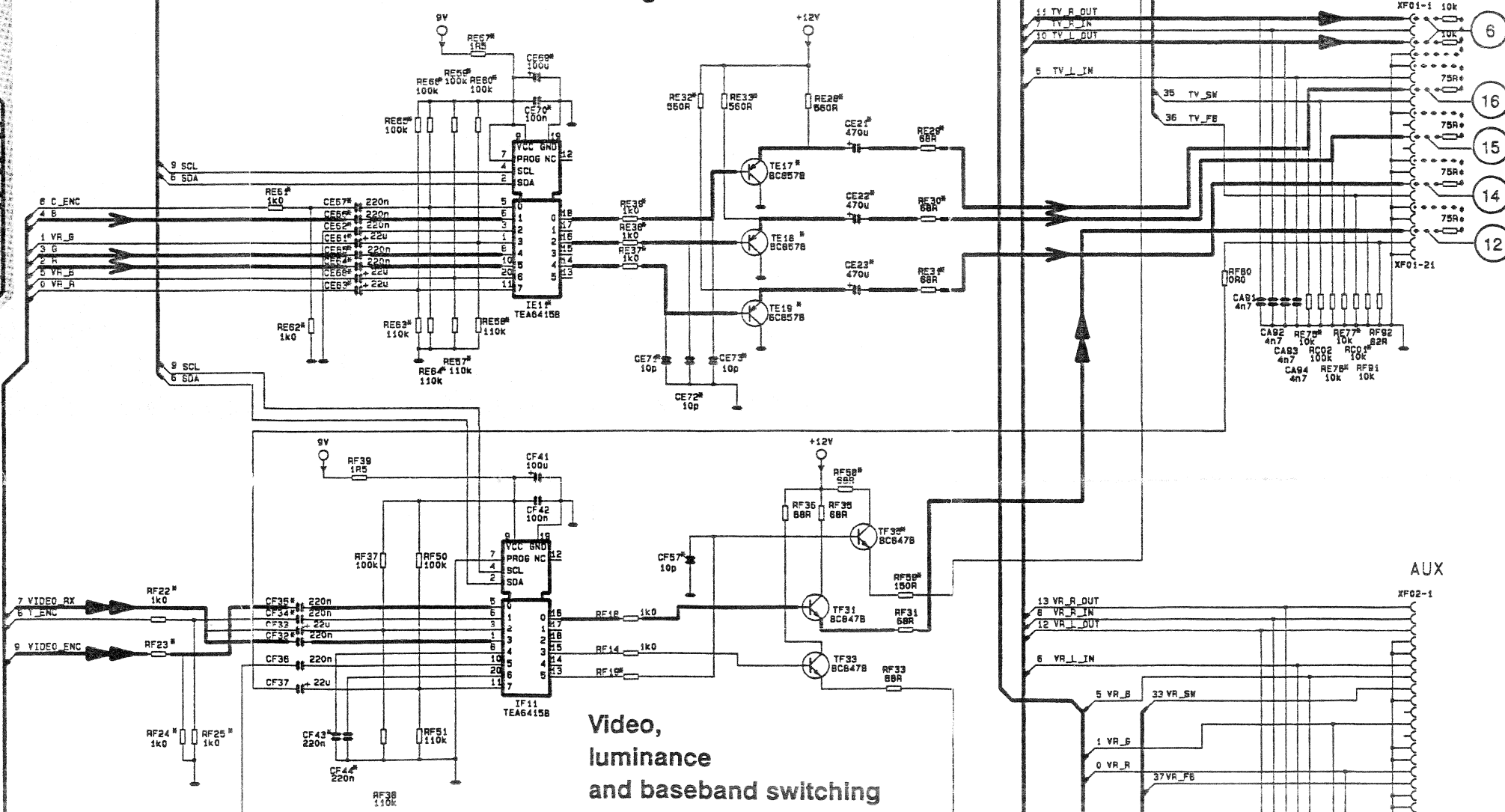
RF processing



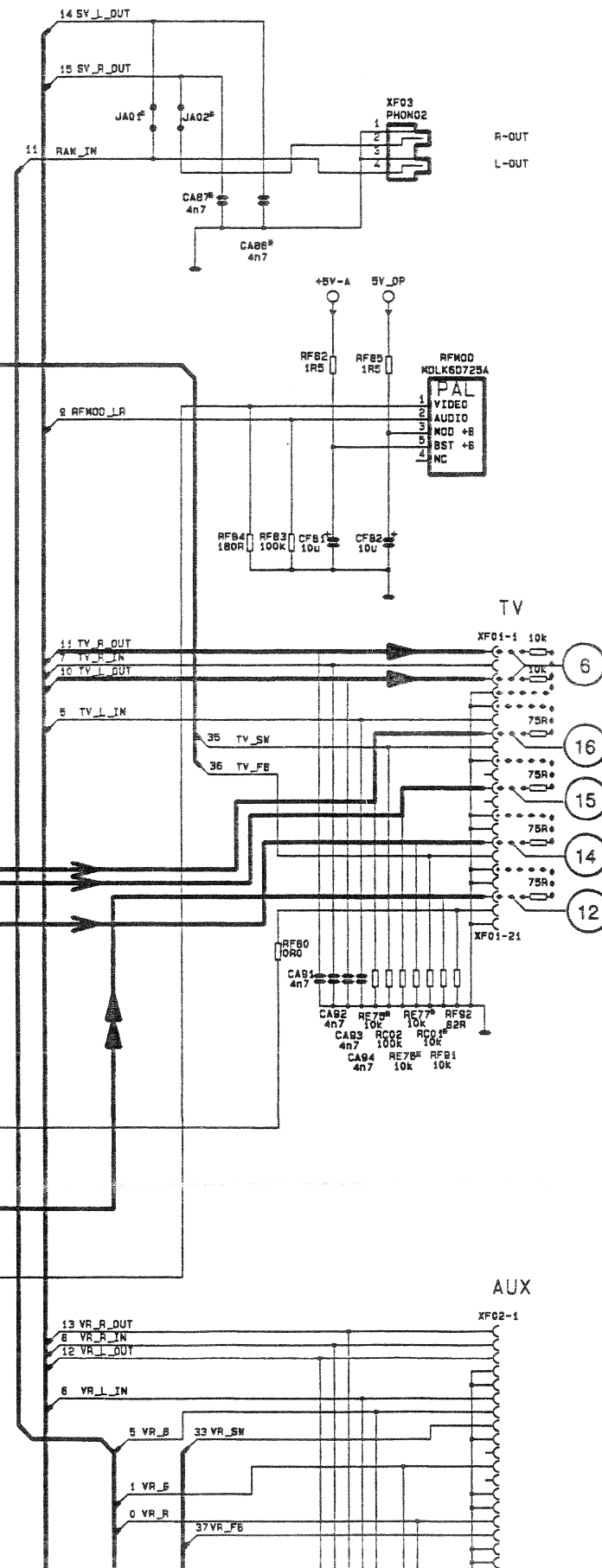
Audio AF processing and switching

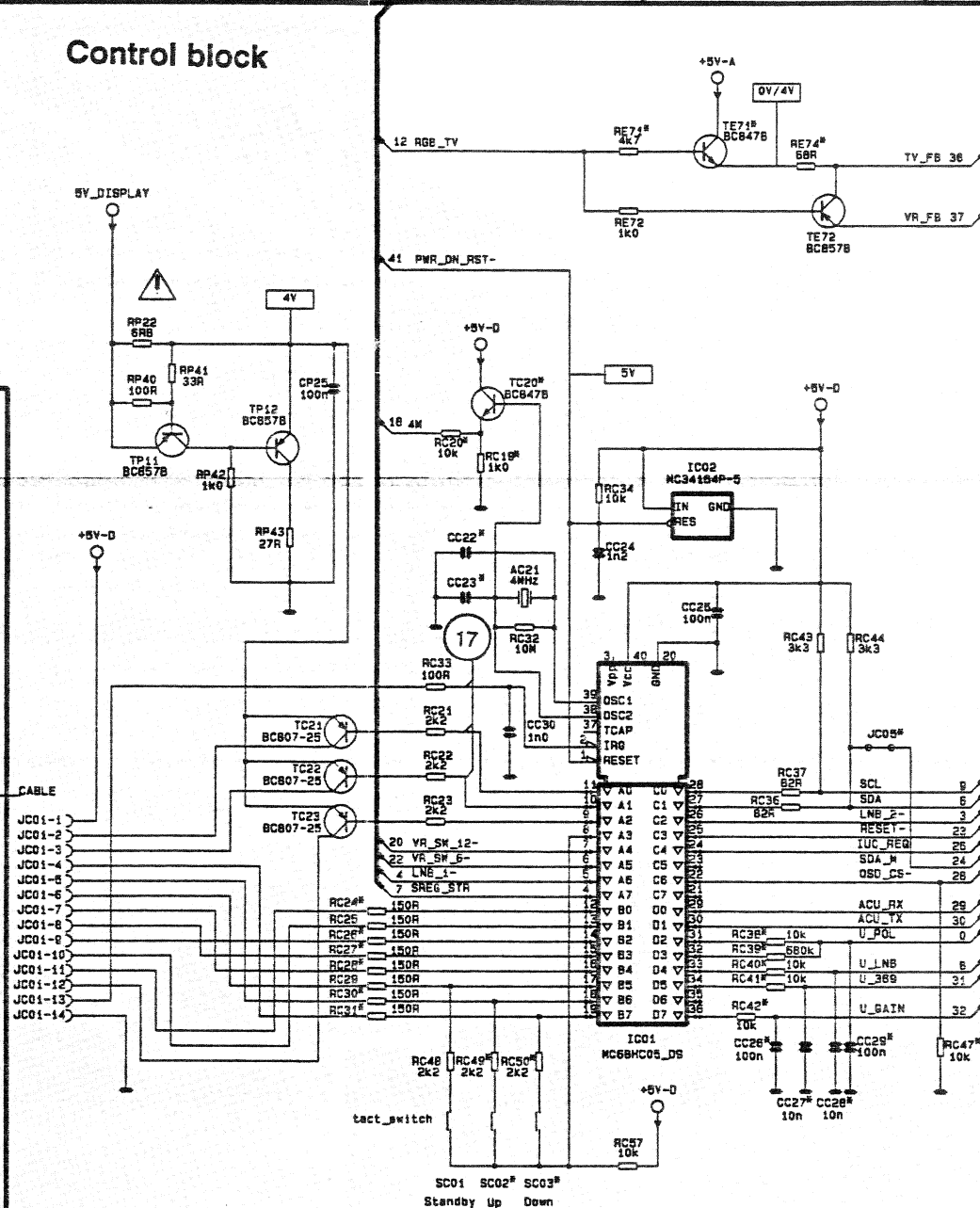
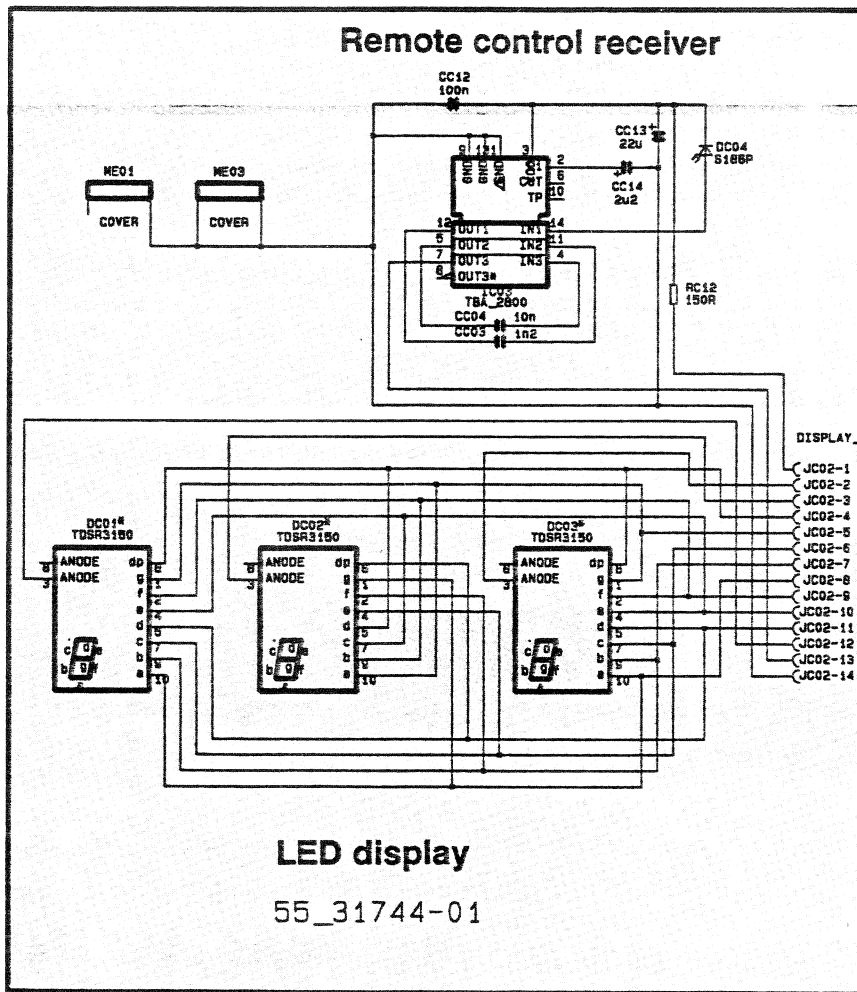
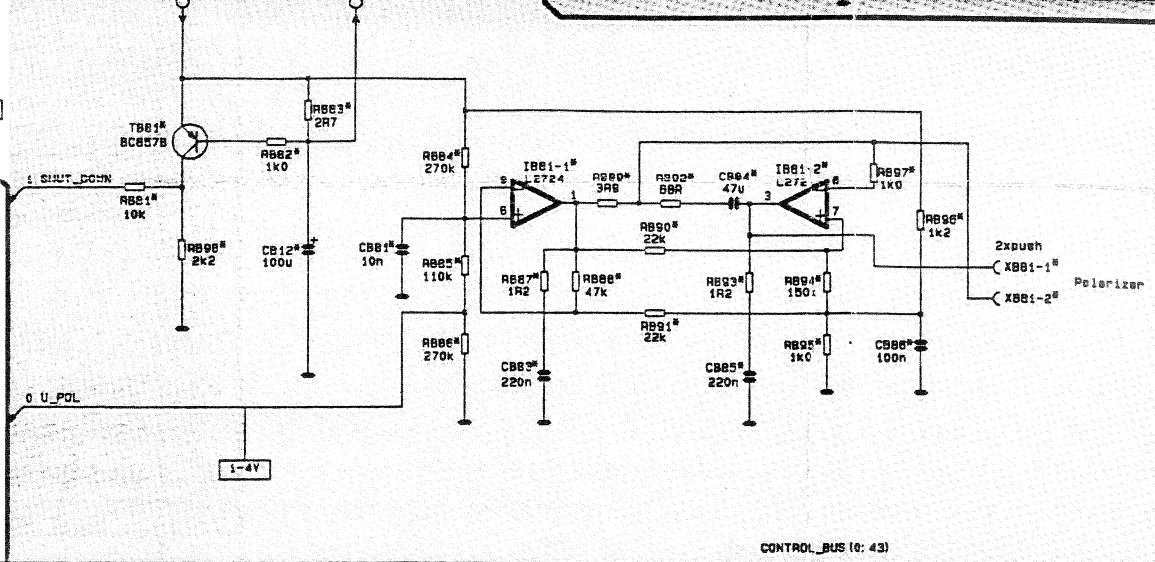
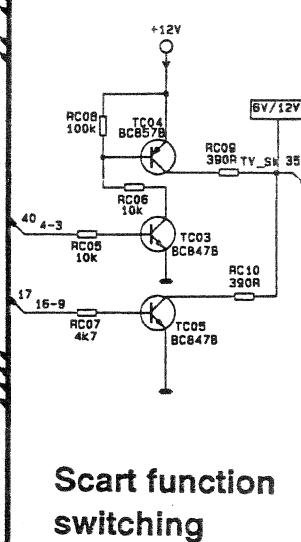
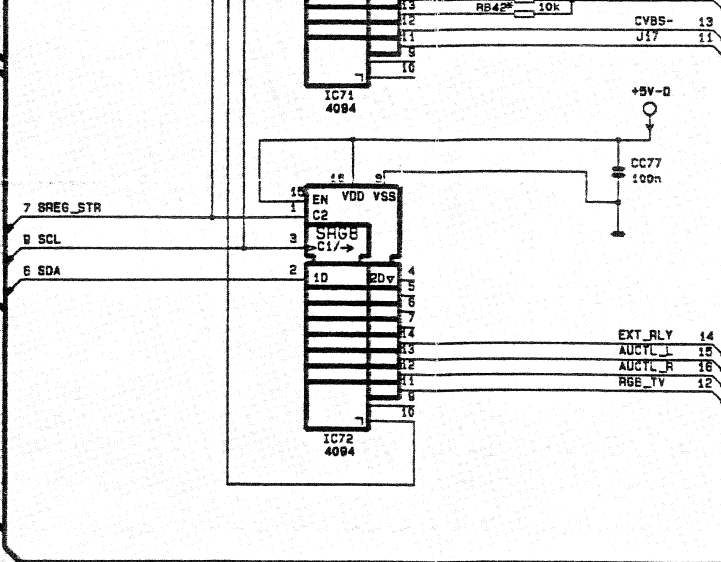
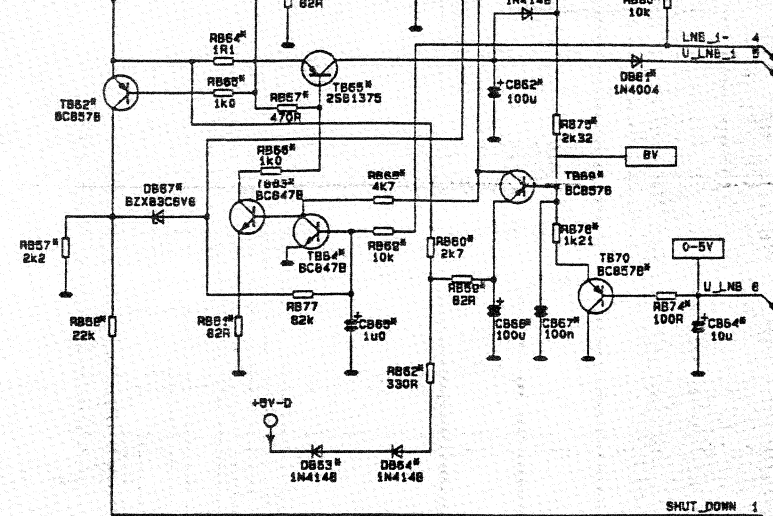


RGB and chroma switching



Video, luminance and baseband switching





Spare Parts List Main P.C. Board

Satellite Receiver, Decoder Main P.C. Board: 55 31741-24, -25, -44, -45, -54, -55, -64, -65

Pos.	Part No.	Description	
IC			
IA21	64 70243-01	TDA 8735	
IA31	64 00082-01	NE 612	
IA61	64 00081-01	TDA 8741	
IA71	64 70241-01	TEA 6420	
IB81	64 20058-01	L 2724	
IC01	64 80108-01	MC 68HC05 -01	Replaced by 64 80108-02
IC01	64 80108-02	MC 68HC05 -02	FROM 9315
IC02	64 70239-11	MC34164P-5	
IC22	64 60036-01	24C16	
IC71	64 40316-01	4094	
IC72	64 40316-01	4094	
IE11	64 70237-01	TEA 6415B	
IF11	64 70237-01	TEA 6415B	
IP01	64 50127-01	CNY 17	
IP02	64 50044-11	TL 431	
			
TA31	63 10189-01	BC 847B	SMD
TA62-63	63 10189-01	BC 847B	SMD
TB62	63 10190-01	BC 857B	SMD
TB63-64	63 10189-01	BC 847B	SMD
TB65-66	63 20118-01	2SB 1375	
TB67-68	63 10189-01	BC 847B	SMD
TB69-70	63 10190-01	BC 857B	SMD
TB81	63 10190-01	BC 857B	SMD
TC03	63 10189-01	BC 847B	SMD
TC04	63 10190-01	BC 857B	SMD
TC05	63 10189-01	BC 847B	SMD
TC11	63 10208-01	BC 817-25	SMD
TC20	63 10189-01	BC 847B	SMD
TC21-23	63 10212-01	BC 807-25	SMD
TC51	63 10189-01	BC 847B	SMD
TC52	63 10190-01	BC 857B	SMD
TC81-82	63 10189-01	BC 847B	SMD
TC85	63 10190-01	BC 857B	SMD
TC91	63 10190-01	BC 857B	SMD
TC92	63 10189-01	BC 847B	SMD
TC93	63 10248-11	BC 369	
TC94	63 10189-01	BC 847B	SMD
TC95	63 10190-01	BC 857B	SMD
TE17-19	63 10189-01	BC 847B	SMD
TE71	63 10189-01	BC 847B	SMD
TE72	63 10190-01	BC 857B	SMD
TE81	63 10189-01	BC 847B	SMD
TF31-35	63 10189-01	BC 847B	SMD
TP01	63 10190-01	BC 857B	SMD
TP02-03	63 10189-01	BC 847B	SMD
TP04	63 30019-01	2SK 1118	
TP05	63 10190-01	BC 857B	SMD
TP06	63 10189-01	BC 847B	SMD
TP07	63 10248-11	BC 369	
TP08	63 10032-11	BC 636-10	
TP09	63 10189-01	BC 847B	SMD
TP10	63 10017-11	BC 337-25	
TP11-12	63 10190-01	BC 857B	SMD

Pos.	Part No.	Description	
TP13	63 10035-11	BC 327-25	
TP14	63 10189-01	BC 847B	SMD
			
AC21	63 90027-01	CRYSTAL 4.000 MHz	
			
RA21	61 29282-01	8,2K	
RA22	61 29258-01	1K	
RA31	61 00115-02	1,5R 5% 0,25W FLAM	△
RA41	61 29254-01	330R	
RA42	61 00115-02	1,5R 5% 0,25W FLAM	△
RA48-49	61 29254-01	330R	
RA51	61 29254-01	330R	
RA53	61 29256-01	470R	
RA56-59	61 29258-01	1K	
RA60	61 29261-01	2,7K	
RA70	61 00115-02	1,5R 5% 0,25W FLAM	△
RA73-78	61 29256-01	470R	
RB01	61 29265-01	10K	
RB02	61 03639-01	0,22R 5% 0,25W FLAM	△
RB58	61 29268-01	22K	
RB62	61 29254-01	330R	
RB64	61 40791-01	1,10R 1% 0,5W	
RB67	61 29256-01	470R	
RB69	61 29265-01	10K	
RB70	61 29256-01	470R	
RB73	61 29265-01	10K	
RB74	61 29250-01	100R	
RB75	61 40252-01	2,32K 1% 0,25W	
RB79-81	61 29265-01	10K	
RB82	61 29258-01	1K	
RB83	61 00004-01	2,7R 5% 0,25W	
RB84	61 29544-01	270K	
RB85	61 40489-01	110K 1% 0,5W	
RB87	61 03643-01	1,2R	
RB92	61 29511-01	68R	
RB93	61 03643-01	1,2R	
RB94	61 29275-01	150K	
RB96	61 29290-01	1,2K	
RB97	61 29258-01	1K	
RC07	61 29263-01	4,7K	
RC09-10	61 29255-01	390R	
RC33	61 29250-01	100R	
RC40	61 29265-01	10K	
RC42	61 29265-01	10K	
RC46-47	61 29265-01	10K	
RC49-50	61 29260-01	2,2K	
RC56	61 29254-01	330R	
RC59	61 00006-02	5,6R 5% 0,25W FLAM	△
RC61	61 29270-01	33K	
RC81	61 29265-01	10K	
RC82	61 29259-01	1,5K	
RC84	61 29268-01	22K	
RC89	61 00101-02	4,7R 5% 0,25W	
RC91	61 29265-01	10K	
RC94	61 29250-01	100R	
RC95	61 40349-01	1,47K 1% 0,33W	
RC96	61 29250-01	100R	

Spare Parts List Main P. C. Board

Satellite Receiver, Decoder Main P.C. Board: 55 31741-24, -25, -44, -45, -54, -55, -64, -65

Pos.	Part No.	Description
		
RC98-99	61 29250-01	100R
RE28-33	61 29511-01	68R
RE35	61 29674-01	120R
RE61	61 29258-01	1K
RE67	61 00115-02	1,5 R 5% 0,25 FLAM 
RE72	61 29258-01	1K
RE74	61 29511-01	68R
RF20	61 40052-01	100K 1%
RF30-31	61 29511-01	68R
RF33-36	61 29511-01	68R
RF37	61 40052-01	100K 1% 0,5W
RF39	61 00115-02	1,5R 5% 0,25W FLAM 
RF41	61 29675-01	820R
RF42	61 29253-01	270R
RF43	61 29259-01	1,5K
RF54	61 29511-01	68R
RF58	61 29511-01	68R
RF59	61 29251-01	150R
RF60	61 29258-01	1K
RF82	61 00115-02	1,5R 5% 0,25W FLAM 
RF85	61 00115-02	1,5R 5% 0,25W FLAM 
RP02	61 40330-01	383K 1% 0,5W
RP04	61 40174-01	22K 5% 2W
RP05	61 40726-01	3,3K 5% 1W UNTIL 9241
RP05	61 40792-01	3,3K 5% 2W FROM 9242
RP18	61 00115-02	1,5R 5% 0,25W FLAM 
RP21	61 40726-01	3,3K 5% 1W
RP22	61 03621-01	6,8R 5% 0,25W FLAM 
RP27	61 40007-01	3,32K 1% 0,5W
RP29	61 40789-01	4,7K 5% 2W
RP36	61 29254-01	330R
RP36	61 29256-01	470R
RP37	61 29265-01	10K
RP40	61 29250-01	100R
RP41	61 29248-01	33R
RP42	61 29258-01	1K
RP43	61 29673-01	27R
		
CA17-18	62 50263-11	47µF 20% 50V
CA20	62 20244-01	1,0µF 10% 63V
CA24	62 21242-11	27PF 2% 50V
CA26	62 00743-11	56PF 2% 50V
CA28	62 00093-11	10PF 2% 50V
CA38	62 50262-11	22µF 20% 50V
CA40	62 20192-11	220NF 10% 63V
CA41	62 50135-11	1µF 20% 100V
CA42	62 50261-11	10µF 20% 50V
CA43	62 30090-11	4,7NF 5% 63V
CA44-45	62 50262-11	22µF 20% 50V
CA47	62 50260-11	4,7µF 20% 63V
CA48	62 50262-11	22µF 20% 50V
CA50	62 20192-11	220NF 10% 63V
CA51	62 50135-11	1µF 20% 100V
CA52	62 50261-11	10µF 20% 50V
CA53	62 30090-11	4,7NF 5% 63V

Pos.	Part No.	Description
CA54	62 20192-11	220NF 10% 63V
CA56	62 20192-11	220NF 10% 63V
CA58-67	62 50135-11	1µF 20% 100V
CA68-70	62 50262-11	22µF 20% 50V
CA71-72	62 50261-11	10µF 20% 50V
CA75-76	62 50261-11	10µF 20% 50V
CB12	62 50264-11	100µF 20% 25V
CB61	62 50135-11	1µF 20% 100V
CB62-63	62 50264-11	100µF 20% 25V
CB64	62 50261-11	10µF 20% 50V
CB65	62 50135-11	1µF 20% 100V
CB66	62 50264-11	100µF 20% 25V
CB83	62 20192-11	220NF 10% 63V
CB84	62 50276-11	47µF 20% 16V BPEL
CB85	62 20192-11	220NF 10% 63V
CC95-96	62 50261-11	10µF 20% 50V
CE21-23	62 50087-11	470µF 20% 10V
CE61	62 50262-11	22µF 20% 50V
CE62	62 20192-11	220NF 10% 63V
CE63	62 50262-11	22µF 20% 50V
CE64-67	62 20192-11	220NF 10% 63V
CE68	62 50262-11	22µF 20% 50V
CE69	62 50264-11	100µF 20% 25V
CF31-32	62 20192-11	220NF 10% 63V
CF33	62 50262-11	22µF 20% 50V
CF34-36	62 20192-11	220NF 10% 63V
CF37-38	62 50262-11	22µF 20% 50V
CF41	62 50264-11	100µF 20% 25V
CF43-44	62 20192-11	220NF 10% 63V
CF45	62 50262-11	22µF 20% 50V
CF81-82	62 50261-11	10µF 20% 50V
CP01	62 10016-01	100NF 20% 250V
CP02	62 50287-01	47µF 20% 400V
CP03	62 21186-01	47NF 10% 250V
CP04	62 01066-11	100PF 10% 1000V
CP07	62 50262-11	22µF 20% 50V
CP08	62 00658-11	150PF 10% 500V
CP09	62 01094-11	220PF 10% 2000V
CP11-12	62 50282-01	1000µF 20% 25V
CP14	62 50282-01	1000µF 20% 25V
CP15	62 50089-01	1000µF 20% 16V
CP16	62 50098-11	22µF 20% 63V
CP17	62 50282-01	1000µF 20% 25V
CP18	62 50089-01	1000µF 20% 16V
CP19	62 50098-11	22µF 20% 63V
CP20	62 50261-11	10µF 20% 50V
CP21	62 50089-01	1000µF 20% 16V
CP23	62 50261-11	10µF 20% 50V
CP26	62 00659-01	2,2NF 20% 400V
CP28	62 50264-11	100µF 20% 25V
CP30	62 50262-11	22µF 20% 50V
CP31	62 50263-11	47µF 20% 50V

Spare Parts List Main P.C. Board

Satellite Receiver, Decoder Main P.C. Board: 55 31741-24, -25, -44, -45, -54, -55, -64, -65

Pos.	Part No.	Description
		
DA21	63 08824-01	DIODE 1N 4148
DA31	63 40387-01	DIODE BB 620
DA41-42	63 08824-01	DIODE 1N 4148
DB61-62	63 40070-01	DIODE 1N 4004
DB63-66	63 08824-01	DIODE 1N 4148
DB67	63 40025-01	ZENERDIODE BZX83C6V8
DC31	63 08824-01	DIODE IN 4148
DP01	63 40262-01	RECTIFIER 400V
DP02	63 40141-01	BZX 83C 30
DP03	63 08751-01	BA 159
DP04	63 40244-01	PE 2D
DP05	63 08824-01	1N 4148
DP06	63 40111-01	BZX 83C 12 UNTIL 9251
DP06	63 40429-01	BZX 55B 12 FROM 9252
DP07-08	63 08824-01	1N 4148
DP09	63 40169-01	BZX 83C 15
DP10	63 08824-01	1N 4148
DP11	63 40335-01	DIODE UF 5402
DP12	63 40335-01	DIODE UF 5402
DP13	63 40336-01	DIODE 1N 5822
DP14	63 40329-01	1N 5819
DP16	63 40244-01	PE 2D
DP17	63 08824-01	1N 4148
DP19	63 08824-01	1N 4148
DP20	63 08751-01	BA 159
DP21	63 40088-01	BZX 83C 27
DP22-24	63 08824-01	1N 4148
	63 40257-01	DIODE BAT 42 Schottky only main board -04
		
FP01	65 70038-11	FUSE 400MA T RADIAL
		
LA11	59 00252-01	DR 4,7μH 10% AX. BAN.
LA12	59 00262-01	DR 10μH 5% AX. BAN.
LA31	59 00438-01	DR 1μH 10% AX. BAN.
LA61	59 00270-01	DR 2,2μH 10% AX. BAN.
LP01	58 30625-01	CHOKE 2x25 MH UNTIL 9231
LP01	58 30625-02	MAINS FILTER CHOKE FROM 9232
LP02-03	59 00426-01	DR 10 μH
LP04-05	59 00252-01	DR 4,7 μH 10% AX. BAN.
LP06	59 00426-01	DR 10 μH
LP07-08	59 00423-01	DR 5 μH
		
FA43	63 90137-01	K FILTER SFE10,7MA20-A
FA51	63 90150-01	K.FILTER SFE 10,70MJA10K
FA52	63 90135-01	K.FILTER SFE 10,52MJA10K

Pos.	Part No.	Description
Connectors		
XB01	43 61321-01	PIN CONNECTOR 16-POL
XB81	55 60065-01	2 x PUSH TERMINAL
XC15	43 40308-01	CONNECTOR 2-POL PHONO J
XC23	43 61204-03	PIN CONNECTOR 4-POL
XE11	43 61286-01	PIN CONNECTOR 2x16-POL
XF01	43 61298-01	CONNECTOR SCART
XF02	43 61298-01	CONNECTOR SCART
XF03	43 40308-01	CONNECTOR 2-POL PHONO J
XP01	43 61234-01	PIN CONNECTOR 2-POL
Miscellaneous on the Main P.C. board		
(VARIANT)		
-	43 61326-01	CABLE HOLDER UNTIL 9238
JC01	43 72259-01	Cable 14-POL L= 300
-	44 21211-01	SUPPORT
-	44 21240-01	SHIELDING BOX IR
-	44 21209-01	SUPPORT
-	44 90055-01	CLIPS
SC01-03	56 40173-01	KEY SWITCH
-	56 90191-01	RF-MODULATOR PAL(G) 40-49
(-54,-55) (-64,-65)	56 90150-01	RF-MODULATOR PAL (I) 30-39
MP01	58 10153-02	TRAFO FM 1908
-	63 80029-01	IC-HOLDER 40 PIN
-	63 80061-01	HEAT SINK UC 1371
-	63 80079-01	WASHER
-	63 80084-01	CLIP, MODULATOR

Spare Parts List Main P. C. Board

Satellite Receiver, Decoder Main P.C. Board: 55 31741-24, -25, -44, -45, -54, -55, -64, -65

[illegible]

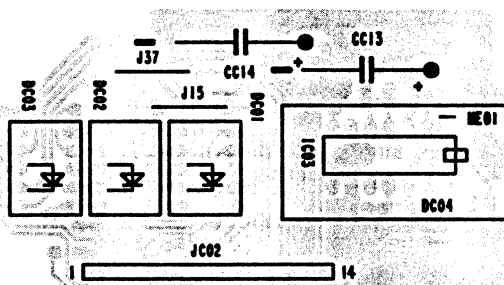
Spare Parts List Panel Module

Panel Module: 55 31744-01, -02

Pos.	Part No.	Description
IC		
IC03	64 70018-01	TBA 2800
CC		
CC13	62 50200-01	22 μ F -20+50% 10V
CC14	62 21101-01	2,2 μ F -20+50% 63 V
Diode		
Receiver = 55 31744-01		
DC01	63 50065-01	DISPLAY TDSG 3150
DC02	63 50065-01	DISPLAY TDSG 3150
DC03	63 50065-01	DISPLAY TDSG 3150
DC04	63 50002-03	S 186P
Decoder = 55 31744-02		
DC04	63 50002-03	S 186P
DC11	63 50004-11	LED green 3,0 mm
DC12	63 50004-11	LED green 3,0 mm
DC13	63 50004-11	LED green 3,0 mm
Miscellaneous		
-	44 21120-01	SHIELDING BOX

SMD RESISTORS			SMD CAPACITORS		
Description	Part No		Description	Part No	
150R 5%0,25W	61 40514-01		1N2 10%50V	62 00676-01	
			10NF 10%50V	62 00675-01	
			100NF Z50V	62 00762-01	

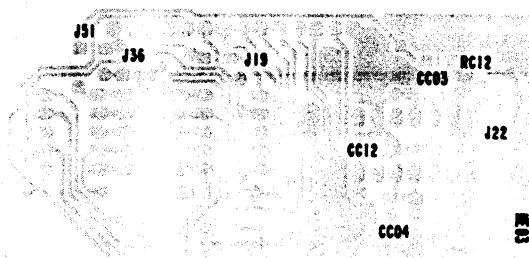
Panel Module: 55 31744-01



Komponentsida

Component Side

Bestückungsseite



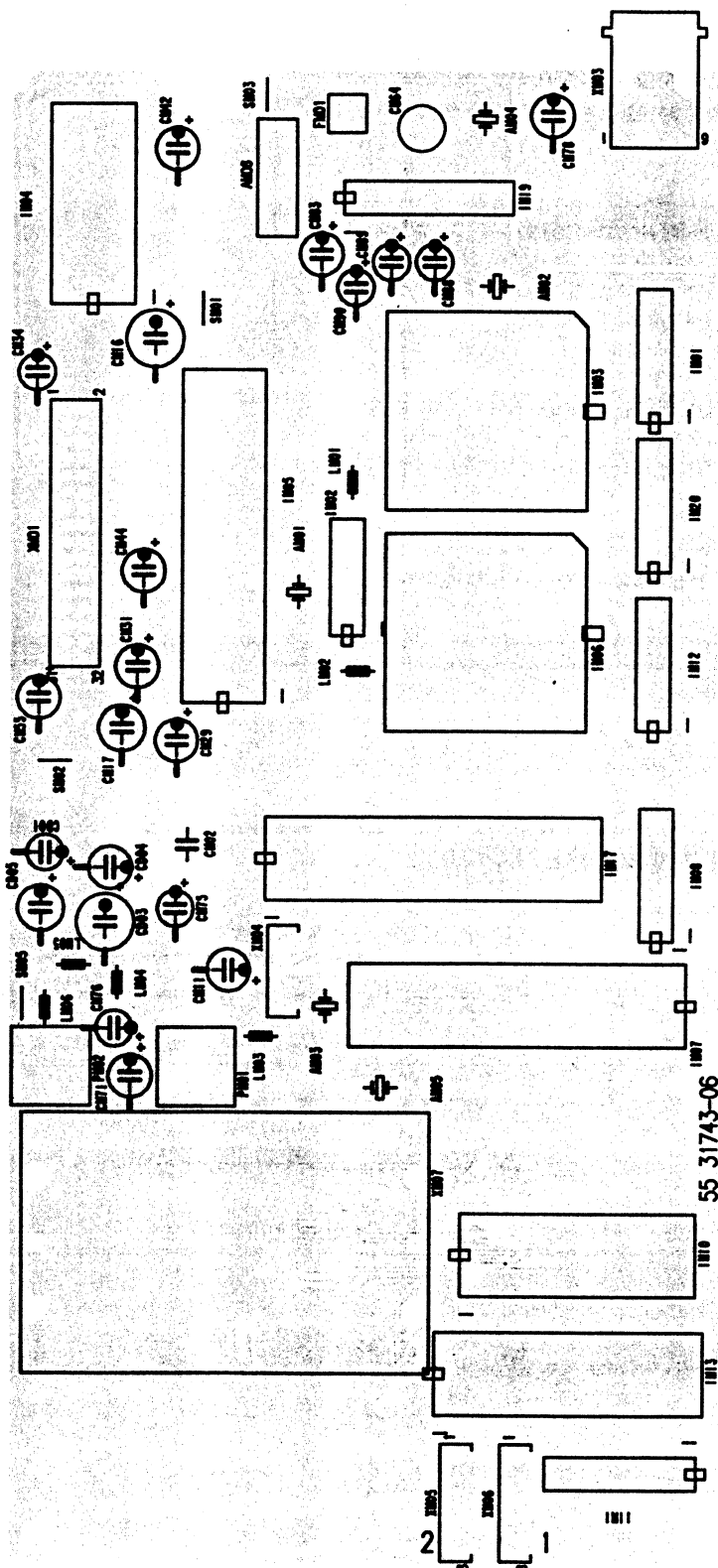
Transcoder Module

Transcoder Module:

Artikel Nr
Part No

55 31743-06, -16

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Spare Parts List page } 36-37
Ersatzteilliste Seite }



Komponentsida

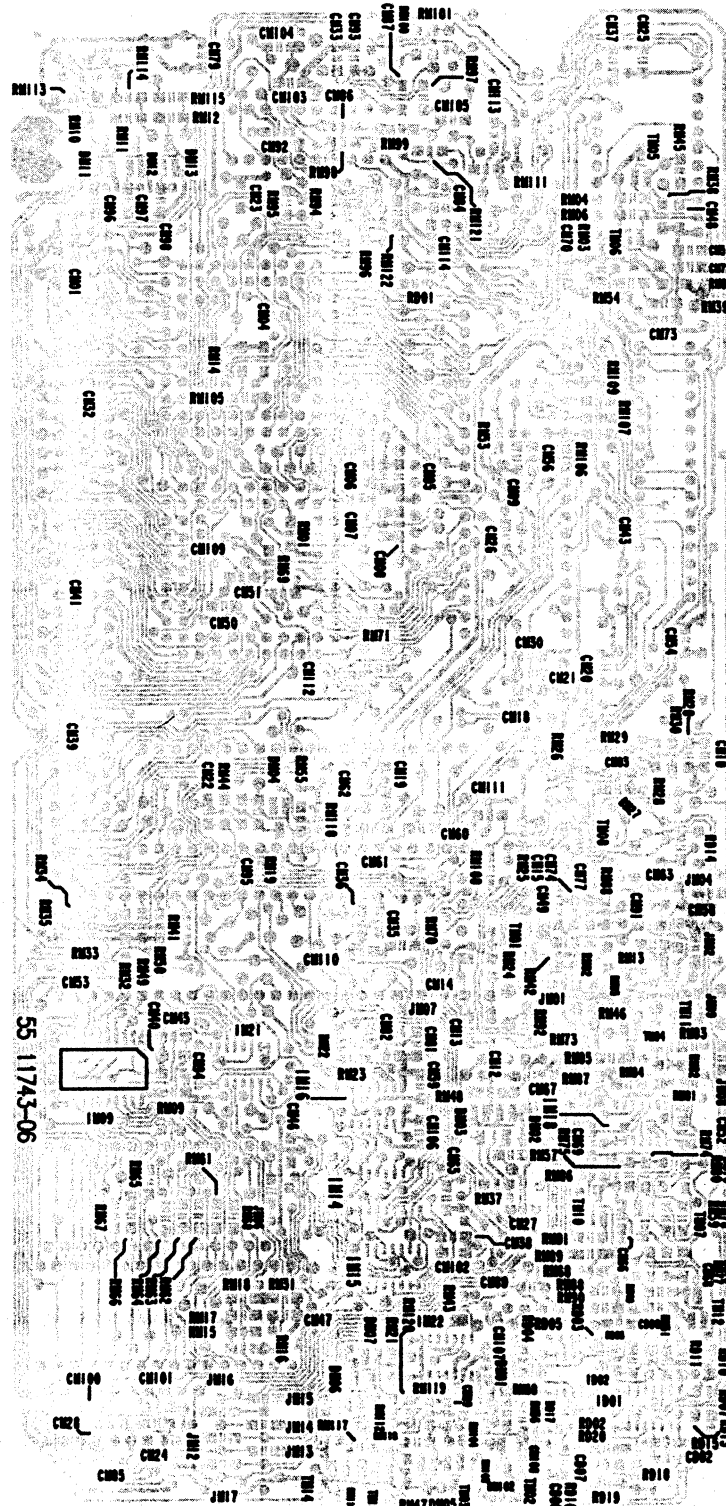
Component Side

Bestückungsseite

Transcoder Module:

Artikel Nr 55 31743-06, -16
Part No

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Lötsekt

Spare Parts List Transcoder Module

Transcoder Module:

55 31743-05, -06, -15, -16

Pos.	Part No.	Description
		
ID01	64 10078-01	LM 3046M SMD
ID02	64 20059-01	TL 082CD SMD
IM01	64 90184-01	UPD 4164-3 UNTIL 9248
IM01	64 60004-01	IC 41256-15 DRAM FROM 9249
IM02	64 70181-01	MCU 2600 TC56
IM03	64 70213-01	DMA 2281 TC12 UNTIL 9214
IM03	64 70213-02	DMA 2281 TC21,TC23 FROM 9215
IM04	64 70182-02	AMU 2481 TC26
IM05	64 70070-04	VCU 2133A TC72
IM06	64 70216-02	DMA 2286 TC42, TC44
IM07	64 80094-01	80 C 652
IM08	64 60004-01	IC 41256-15 DRAM
IM09	64 40329-01	74 HC 573 SMD
IM10	64 60005-01	8Kx8 SRAM CMOS
IM11	64 70244-01	L 6605
IM12	64 90184-01	UPD 4164-3 UNTIL 9248
IM12	64 60004-01	IC 41256-15 DRAM FROM 9249
IM13	64 90601-01	IM13 MAC4 V1.04 UNTIL 9247
IM13	64 90601-02	IM13 MAC4 V1.05 UNTIL 9303
IM13	64 90601-03	IM13 MAC4 V1.06 FROM 9248
IM13	64 90601-04	IM13 MAC4 V1.08 FROM 9304
IM13	64 90601-05	IM13 MAC4 V2.00 DECODER FROM 9304, RECEIVER FROM 9309
IM13	64 90601-07	IM13 MAC4 V2.01 FROM 9315
IM14	64 40373-01	74 HC 259 SMD
IM15	64 40367-01	74 AC 04D SMD
IM16	64 40345-01	74 HC 02 SMD
IM17	64 70071-02	TPU 2735 TC45
IM18	64 10078-01	LM 3046M SMD
IM19	64 20057-01	MC 13077
IM20	64 90184-01	UPD 4164-3 UNTIL 9248
IM20	64 60004-01	IC 41256-15 DRAM UNTIL 9308
IM21	64 40366-01	74 HC 173 D SMD
IM22	64 40345-01	74 HC 02 SMD
		
FM01	59 40128-01	LC-FILTER 4963 DAD
		
LM01-02	59 00225-11	DR 10μH 10% RAD.BAN.
LM03	59 00267-11	DR 1,5μH 10% RAD.BAN.
LM04	59 00294-11	DR 2,2μH 5% RAD.BAN.
LM05	59 00296-11	DR 5,6μH 5% RAD.BAN.
		
TM01-03	63 10189-01	BC 847B SMD
TM04	63 00101-01	BF 799 SMD
TM05-06	63 10189-01	BC 847B SMD
TM07	63 20114-01	BSR16 SMD
TM08	63 10189-01	BC 847B SMD
TM10-11	63 10189-01	BC 847B SMD
TM12	63 30020-01	2N 7002 SMD
TM13	63 10190-01	BC 857B SMD
TM14	63 10189-01	BC 847B SMD

Pos.	Part No.	Description
		
AM01	63 90095-01	CRYSTAL 20,250 MHz UNTIL 9231
AM01	63 90095-11	CRYSTAL 20,250 MHz FROM 9231
AM02	63 90099-11	CRYSTAL 18,432 MHz
AM03	63 90111-01	CRYST. 14,7456 MHz UNTIL 9230
AM03	63 90111-11	CRYST. 14,7456 MHz FROM 9231
AM04	63 90107-01	CRYST. 17,73447 MHz UNTIL 9225
AM04	63 90107-11	CRYST. 17,73447 MHz FROM 9226
AM05	63 90062-01	CRYST. 3,579545 MHz UNTIL 9310
AM05	63 90062-11	CRYST. 3,579545 MHz FROM 9311
AM06	63 60102-01	DELAY LINE 300 NS UNTIL 9248
AM06	63 60104-01	DELAY LINE 400 NS FROM 9249
		
CD01	62 50260-11	4,7μF 20% 63V
CD03	62 50266-11	220μF 20% 50V
CD04	62 50263-11	47μF 20% 50V
CD05	62 50265-11	100μF 20% 50V UNTIL 9310
CD05	62 50264-11	100μF 20% 25V FROM 9311
CM02	62 20211-11	470NF 10% 63V
CM11	62 50263-11	47μF 20% 50V
CM16	62 50266-11	220μF 20% 25V
CM17	62 50265-11	100μF 20% 50V UNTIL 9310
CM17	62 50264-11	100μF 20% 25V FROM 9311
CM29	62 50263-11	47μF 20% 50V
CM34	62 50261-11	10μF 20% 50V
CM42	62 50263-11	47μF 20% 50V
CM44	62 50263-11	47μF 20% 50V
CM55	62 50263-11	47μF 20% 50V
CM64	62 80023-01	C TRIM 4,5 - 20 PF
CM71	62 50263-11	47μF 20% 50V
CM75	62 50260-11	4,7μF 20% 63V
CM76	62 50274-11	22μF 20% 16V
CM83	62 50263-11	47μF 20% 50V
CM88-89	62 50262-11	22μF 20% 50V
CM90	62 50274-11	22μF 20% 16V
		
DM01-03	63 40308-01	BAV 99
DM05	63 40372-01	BZX 84C 4V7
DM06-07	63 40312-01	BAS 16
DM11-13	63 40308-01	BAV 99
Connectors		
XM01	43 61288-01	CONNECTOR 2x16 PIN
XM03	43 61323-02	MODULAR JACK 6-POL
XM05	43 61508-01	PIN CONNECTOR 8-POL
XM06	43 61508-01	PIN CONNECTOR 8-POL

Spare Parts List Transcoder Module

Transcoder Module:

55 31743-05, -06, -15, -16

Pos.	Part No.	Description
Miscellaneous		
XM07	43 90322-03	CARD READER
-	63 80025-01	IC-HOLDER 18 PIN UNTIL 9221
-	63 80026-01	IC-HOLDER 20 PIN UNTIL 9221
-	63 80029-01	IC-HOLDER 40 PIN
-	63 80066-01	IC-HOLDER 68 PIN
-	63 80076-01	IC-HOLDER 32 PIN

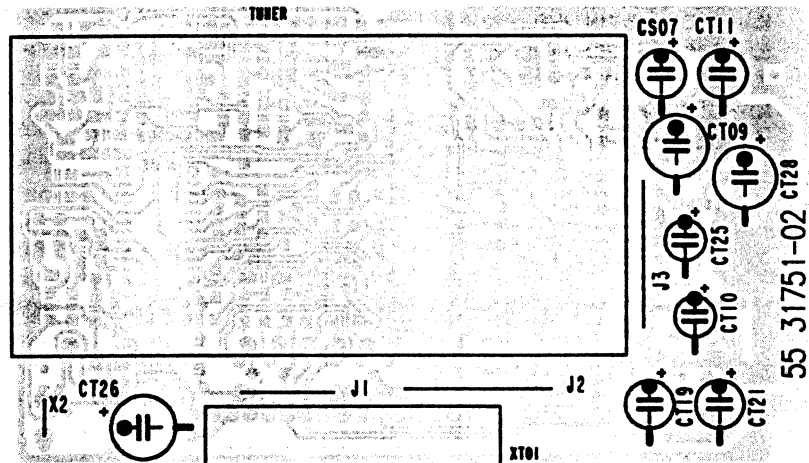
SMD RESISTORS		SMD CAPACITORS	
Description	Part No	Description	Part No
3R9 5%0,25W	61 40608-01	15PF 5%50V	62 01069-01
10R 5%0,25W	61 40511-01	27PF 5%50V	62 00672-01
22R 5%0,25W	61 40531-01	33PF 5%50V	62 00744-01
47R 5%0,25W	61 40584-01	39PF 5%50V	62 00759-01
68R 5%0,25W	61 40574-01	56PF 5%50V	62 00765-01
100R 5%0,25W	61 40466-01	68PF 5%50V	62 00764-01
180R 5%0,25W	61 40575-01	82PF 5%50V	62 00691-01
220R 5%0,25W	61 40424-01	100PF 5%50V	62 00665-01
270R 5%0,25W	61 40438-01	150PF 5%50V	62 00757-01
390R 5%0,25W	61 40537-01	470PF 5%50V	62 00750-01
432R 1%0,125W	61 40736-01	1,0NF 10%50V	62 00767-01
470R 5%0,25W	61 40544-01	1,5NF 5%50V	62 01063-01
510R 1%0,125W	61 40570-01	10NF 10%50V	62 00675-01
560R 5%0,25W	61 40445-01	47NF Z 50V	62 00761-01
681R 1%0,125W	61 40601-01	100NF Z 50V	62 00762-01
750R 1%0,125W	61 40724-01		
820R 5%0,25W	61 40553-01		
1K0 1%0,125W	61 40498-01		
1K0 5%0,25W	61 40514-01		
1K33 1%0,125W	61 40787-01		
1K8 5%0,25W	61 40431-01		
1K82 1%0,125W	61 40665-01		
2K2 5%0,25W	61 40439-01		
3K3 5%0,25W	61 40440-01		
3K9 5%0,25W	61 40545-01		
4K7 5%0,25W	61 40507-01		
5K6 5%0,25W	61 40444-01		
6K8 5%0,25W	61 40554-01		
10K 5%0,25W	61 40480-01		
27K 5%0,25W	61 40543-01		
68K 5%0,25W	61 40503-01		
120K 5%0,25W	61 40536-01		
270K 5%0,25W	61 40546-01		
330K 5%0,25W	61 40535-01		
1M 5%0,25W	61 40437-01		
		SMD JUMPERS	
		2A 61 40486-01	

Tuner Module

Tuner Module:

Artikel Nr 55 31751-02
Part No

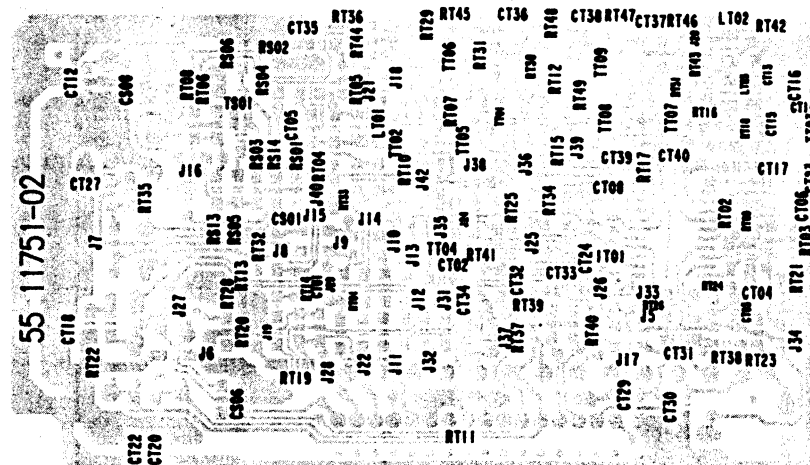
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Spare Part List Tuner Module

Tuner Module: 55 31751-02

Pos.	Part No.	Description	
			
IT01	64 00075-01	TDA 6151X	SMD
			
TS01	63 10189-01	BC 847B	SMD
TT01	63 10190-01	BC 857B	SMD
TT02	63 10190-01	BC 857B	SMD
TT03	63 10190-01	BC 857B	SMD
TT04	63 10190-01	BC 857B	SMD
TT05	63 10189-01	BC 847B	SMD
TT06	63 10190-01	BC 857B	SMD
TT07	63 10189-01	BC 847B	SMD
TT08	63 10189-01	BC 847B	SMD
TT09	63 10189-01	BC 847B	SMD
			
RT52	61 29272-01	47K 5% 0,25W	
			
CS07	62 50263-11	47µF 20% 50V	
CT09	62 50265-11	100µF 20% 50V UNTIL 9309	
CT09	62 50264-11	100µF 20% 25V FROM 9310	
CT10	62 50260-11	4,7µF 20% 63V	
CT11	62 50263-11	47µF 20% 50V	
CT19	62 50263-11	47µF 20% 50V	
CT21	62 50263-11	47µF 20% 50V	
CT25	62 50260-11	4,7µF 20% 63V	
CT26	62 50266-11	220µF 20% 25V	
CT28	62 50265-11	100µF 20% 50V UNTIL 9309	
CT28	62 50264-11	100µF 20% 25V FROM 9310	
CT33	62 00756-01	47PF 5% 50V	
			
LT01	59 00297-01	33µF 10%	SMD
LT02	59 00298-01	4,7µF 10%	SMD
LT03	59 00299-01	10µF 5%	SMD
Connectors			
XT-01	43 61322-01	FEMALE CONNECTOR 16-POL	
Miscellaneous			
-	56 70058-01	TUNER SXT 2000	
X2	61 10168-11	CLAMP d=0,6MM	

SMD RESISTORS			SMD CAPACITORS		
Description	Part No		Description	Part No	
3R9 5% 0,25W	61 40608-01		33PF 5% 50V	62 00744-01	
68R 5% 0,25W	61 40574-01		39PF 5% 50V	62 00759-01	
			47PF 5% 50V	62 00756-01	
100R 5% 0,25W	61 40466-01		56PF 5% 50V	62 00765-01	
120R 5% 0,25W	61 40572-01				
150R 5% 0,25W	61 40541-01		68PF 5% 50V	62 00764-01	
180R 5% 0,25W	61 40575-01		82PF 5% 50V	62 00691-01	
220R 5% 0,25W	61 40424-01				
270R 5% 0,25W	61 40438-01		100PF 5% 50V	62 00665-01	
301R 1% 0,125W	61 40748-01		120PF 5% 50V	62 00689-01	
390R 5% 0,25W	61 40537-01		180PF 5% 50V	62 00748-01	
470R 5% 0,25W	61 40544-01		220PF 5% 50V	62 00692-01	
680R 5% 0,25W	61 40513-01		680PF 5% 50V	62 00747-01	
820R 5% 0,25W	61 40553-01				
			1,0NF 10% 50V	62 00767-01	
1K0 1% 0,125W	61 40498-01		2,2NF 10% 50V	62 00763-01	
1K0 5% 0,25W	61 40514-01		100NF 10% 50V	62 00754-01	
1K2 5% 0,25W	61 40508-01		100NF Z 50V	62 00762-01	
1K5 5% 0,25W	61 40509-01				
1K54 1% 0,125W	61 40625-01		150NF 10% 50V	62 01096-01	
1K8 5% 0,25W	61 40431-01		220NF 10% 50V	62 01087-01	
2K2 5% 0,25W	61 40439-01				
2K7 5% 0,25W	61 40433-01		SMD JUMPERS		
3K3 5% 0,25W	61 40440-01				
4K7 5% 0,25W	61 40507-01				
10K 5% 0,25W	61 40480-01				
15K 5% 0,25W	61 40423-01				
46K4 1% 0,125W	61 40618-01				
47K 5% 0,25W	61 40442-01				
237K 1% 0,125W	61 40658-01				
330K 5% 0,25W	61 40535-01				
680K 5% 0,25W	61 40532-01				
1M 5% 0,25W	61 40437-01				

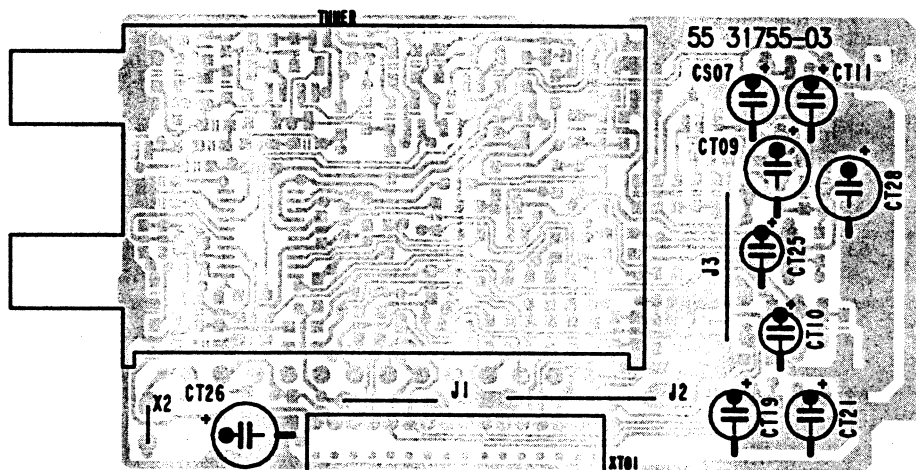
2A 61 40486-01

Tuner Module

Tuner Module:

Artikel Nr 55 31755-03
Part No

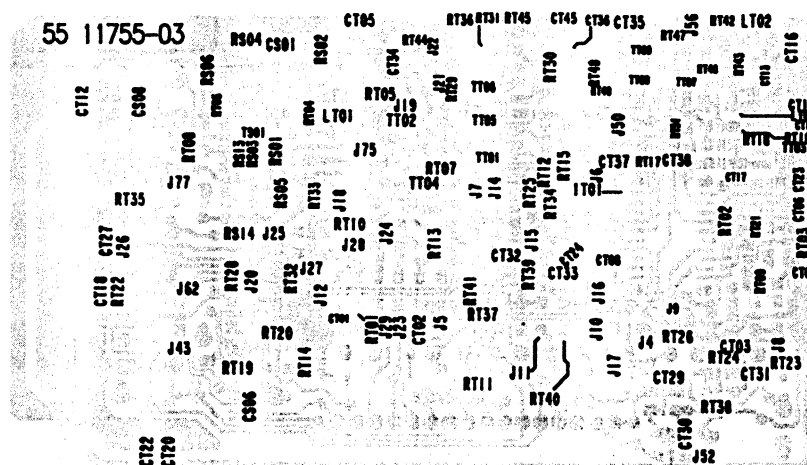
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Component Side

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Spare Part List Tuner Module

Tuner Module: 55 31755-02, -03

Pos.	Part No.	Description	
			
IT01	64 00075-01	TDA 6151X	SMD
			
TS01	63 10189-01	BC 847B	SMD
TT01	63 10190-01	BC 857B	SMD
TT02	63 10190-01	BC 857B	SMD
TT04	63 10190-01	BC 857B	SMD
TT05	63 10189-01	BC 847B	SMD
TT06	63 10190-01	BC 857B	SMD
TT07	63 10189-01	BC 847B	SMD
TT08	63 10189-01	BC 847B	SMD
TT09	63 10189-01	BC 847B	SMD
			
RT52	61 29272-01	47K 5% 0,25W	
			
CS07	62 50263-11	47µF 20% 50V	
CT09	62 50265-11	100µF 20% 50V UNTIL 9309	
CT09	62 50264-11	100µF 20% 25V FROM 9310	
CT10	62 50260-11	4,7µF 20% 63V	
CT11	62 50263-11	47µF 20% 50V	
CT19	62 50263-11	47µF 20% 50V	
CT21	62 50263-11	47µF 20% 50V	
CT25	62 50260-11	4,7µF 20% 63V	
CT26	62 50266-11	220µF 20% 25V	
CT28	62 50265-11	100µF 20% 50V UNTIL 9310	
CT28	62 50264-11	100µF 20% 25V FROM 9311	
CT33	62 00756-01	47PF 5% 50V	
			
LT01	59 00297-01	33µF 10%	SMD
LT02	59 00298-01	4,7µF 10%	SMD
LT03	59 00299-01	10µF 5%	SMD
Connectors			
XT-01	43 61322-01	FEMALE CONNECTOR 16-POL	
Miscellaneous			
-	56 70060-01	TUNER BSF E77G02	
X2	61 10168-11	CLAMP d=0,6MM	

SMD RESISTORS			SMD CAPACITORS		
Description	Part No		Description	Part No	
3R9 5%0,25W	61 40608-01		47PF 5%50V	62 00756-01	
68R 5%0,25W	61 40574-01		68PF 5%50V	62 00764-01	
100R 5%0,25W	61 40466-01		100PF 5%50V	62 00665-01	
120R 5%0,25W	61 40572-01		180PF 5%50V	62 00748-01	
150R 5%0,25W	61 40541-01		680PF 5%50V	62 00747-01	
180R 5%0,25W	61 40575-01		1,0NF 10%50V	62 00767-01	
220R 5%0,25W	61 40424-01		2,2NF 10%50V	62 00763-01	
270R 5%0,25W	61 40438-01		100NF 10%50V	62 00754-01	
390R 5%0,25W	61 40537-01		100NF Z 50V	62 00762-01	
470R 5%0,25W	61 40544-01		150NF 10%50V	62 01096-01	
680R 5%0,25W	61 40513-01		220NF 10%50V	62 01087-01	
1K0 5%0,25W	61 40514-01				
1K2 5%0,25W	61 40508-01				
1K5 5%0,25W	61 40509-01				
1K54 1%0,125W	61 40625-01				
1K8 5%0,25W	61 40431-01				
2K2 5%0,25W	61 40439-01				
2K7 5%0,25W	61 40433-01				
3K3 5%0,25W	61 40440-01				
4K7 5%0,25W	61 40507-01				
10K 5%0,25W	61 40480-01				
15K 5%0,25W	61 40423-01				
46K4 1%0,125W	61 40618-01				
237K 1%0,125W	61 40658-01				
330K 5%0,25W	61 40535-01				
1M 5%0,25W	61 40437-01				

SMD JUMPERS

2A 61 40486-01

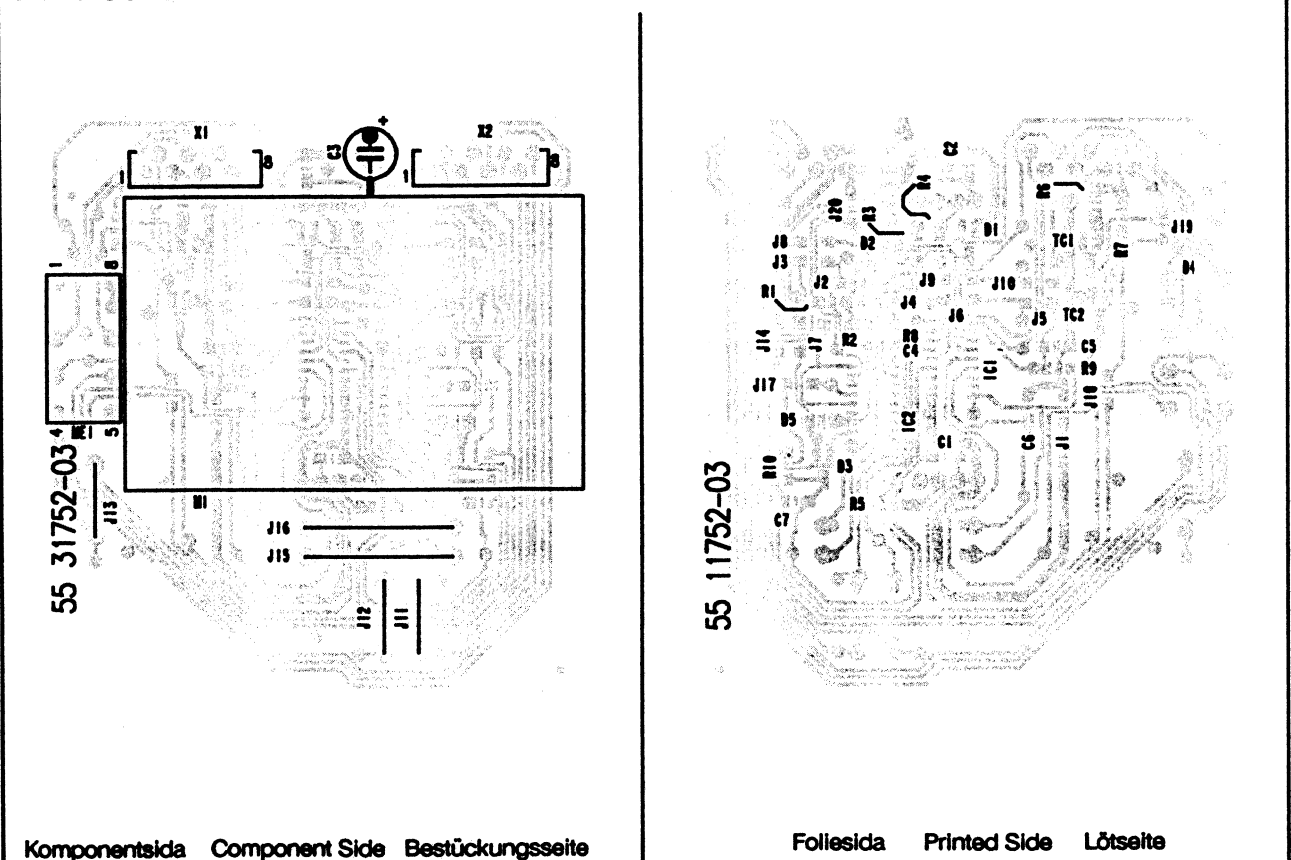
Spare Parts List Twin Card Reader

Twin Card Reader: 55 31752-03

Pos.	Part No.	Description
IC		
IC1	64 40331-01	HEF 4053B
IC2	64 40331-01	HEF 4053B
C3	62 50264-11	100µF 20% 25V
Diodes		
D1-3	63 40308-01	BAV 99
D4	63 40249-01	LL 4148
D5	63 40304-01	XENERDIODE BZV55C5V1
T1-2	63 10189-01	BC 847B SMD
Connectors		
X1-X2	43 61508-01	PIN CONNECTOR 8-POL
Miscellaneous		
M1	43 90322-03	CARD READER
ME1	60 20075-01	RELAY 2-POL 1A/5V DC

SMD RESISTORS		SMD CAPACITORS	
Description	Part No	Description	Part No
180R 5% 0,25W	61 40575-01	1N5 10% 50V	62 01063-01
10K 5% 0,25W	61 40480-01	10NF 10% 50V	62 00675-01
		100NF Z50V	62 00762-01

Twin Card Reader: 55 31752-03



Most functional blocks are on the main board except the tuner and video processing, which due to different tuner alternatives are placed on a separate tuner module. The MAC processing and associated circuits are placed on a separate transcodermodule. The second built-in smart card reader is also placed on its own separate module.

Please refer to the block diagram for overall signal paths and CPU control. Please also use the circuit diagrams for details. This service manual incorporates block diagrams for some individual IC.

Tuner

The tuner has the frequency synthesizer and AFC hardware circuits built-in, and is controlled by the CPU through the IIC-bus. AFC information from the tuner is sent to the CPU over the IIC bus, and the CPU sends tuning info over the IIC bus to the tuner.

The tuning info is transferred to a tuning voltage for the local oscillator, and the tuner keeps the requested frequency correct through its own PLL loop. The tuning voltage is derived from the 27 V input.

The tuner has two LNB inputs, also selected through the IIC bus.

The tuner's AGC voltage is accessible through a hole in the receiver's backpanel, for antenna pointing and system troubleshooting. The AGC voltage must be within 2,0 V and 3,5 V for proper operation of the tuner's video detector (2,0 V corresponds to the lowest signal level).

Video processing

The video processing block is built around IT01 (TDA 6151X), which incorporates a VCA (voltage controlled amplifier), buffer amplifiers and switches for different signals in and out.

The network RT19, RT22 and CT18 provides MAC de-emphasis before the baseband signal enters the VCA. The correct video level output for the selected channel is controlled by the main board CPU through an analog control input on IT01. The normal DC level is 2,95 V for ASTRA clear PAL channels and 3,75 V for ECS clear PAL channels.

The exact value can be set in the service mode, where you will find three separate video amplitude settings, one for MAC reception, one for PAL baseband, and one for clear PAL reception.

On a MAC channel, info of the video level is sent from the DMA2281 (IM03) through the main board CPU, forming a closed loop for tight video level control.

The signal from the VCA is fed from the baseband output on pin 1 to two different networks. If the requested baseband is MAC, then the signal, attenuated by RT09, RT23 and CT26, at pin 5 DEEMP 1 is selected (to finally reach the decoder placed in the AUX-scart). If PAL de-emphasis is required, the signal at pin 3, DEEMP 2 is

selected. The network RT02/RT21/RT03/CT04 provides the additional de-emphasis, from MAC to PAL. RT02/RT21 together with CT26 reduces the amplitude of the signal.

The selection is controlled by the CPU through the DC voltage on pin 2 (UDEEMPH.).

The MAC de-emphasized signal is amplified in TT05/TT06 and routed to the receiver's internal MAC-decoder.

For clear PAL signals, the PAL de-emphasized baseband from the DEEMP 2 is routed to the video filter (TT01, coils LT02, LT03 + surrounding filter components). The buffer stage TT07 feeds the dispersal clamping circuit TT08/TT09. The filtered and clamped video signal is routed back to the TDA 6151's pin 9. After amplification, the signal from the video source selector in IT01 is fed to the receiver's main board through the buffer TT02.

The TDA 6151X has a separate output for audio subcarriers on pin 18. LT 01 and RT04 is a high frequency compensation circuit. The signal (4 to 10 MHz) is routed to the audio processing block on the main board through the buffer TS01.

Video switching

The selected PAL video/PAL baseband/MAC baseband is fed to the video switch circuit IF11 (TEA 6415B). This is a matrix switch with 8 inputs and 6 outputs. To the inputs of TEA 6415 are also available video from the TV-scart, from the AUX-scart and PAL encoded video from the internal MAC transcoder module. The PAL encoder on the transcoder module is also generating the S-video signals Y and C. Of these, the Y signal is routed to IF11, the C-signal is routed to the RGB-switch IE11. The outputs from TEA 6415B are video to the TV-set, baseband video (PAL or MAC) or PAL video (CVBS) to the AUX-scart and video to the RF-modulator. The video switch is controlled by the CPU over the IIC bus.

RGB-switch

Due to the existence of PAL-decoders with menus on RGB only, the 5928 receiver must have an RGB-switch. S-video bypass from an SVHS recorder is also possible since the C-signal is carried on pin 15 (same as the R-signal) in the scart.

The inputs of IE11 are thus RGB and C from the MAC transcoder module and RGB from the AUX scart. The output goes to the TV scart pins 7, 11 and 15.

Audio processing

The audio processing block performs selection of the desired audio subcarrier(s), detection, Weyner Panda processing and audio switching for the different audio inputs/outputs.

The baseband signal from the tuner module passes through a band pass filter 5-10 MHz, where the audio

Circuit description 5928 / SAT 2202 CS

signals are filtered out and the video signal is suppressed.

The frequency synthesizer IA21 (TDA 8735) controls the oscillator in the mixer IA31 (NE 612) through a PLL loop. Tuning of the selected subcarrier is done through the IIC-bus from the CPU. The oscillator in NE 612 is tuned by the capacitance diode DA31.

At the output from the mixer IC is now available the desired subcarrier shifted up to 10,70 MHz (and 10,52 MHz in case of a stereo pair). These frequencies are filtered out by FA51/FA52 (or, in case of a mono subcarrier, the wide band filter FA43). IF amplification and FM detection is done in IA61 (TDA 8741).

After detection, the Wegener Panda 1 processing is automatically performed inside IA61 on all applicable signals. IA61 incorporates a source switch where selection of mono or stereo audio is done. The audio system selection is done through special TTL level commands from the CPU.

All audio signals are routed to the audio matrix switch IA71 (TEA 6420): Audio from TDA8741 (two lines for stereo audio and narrow band mono respectively and one line for wide band mono), MAC audio from the transcoder module, audio from the TV-scart and from the AUX-scart. The outputs are audio to the TV-scart/RF-modulator, to the AUX-scart and to the HiFi output.

The switching is controlled by the CPU over the IIC bus.

The TEA 6420 has a volume level adjustment of 0–6 dB, for adjusting the audio level from the satellite receiver to the same level as the TV-set's terrestrial audio level (global adjustment, done in the receiver's service menu). MAC audio balancing (with reference to the PAL audio) is done in the MAC service menu.

The audio matrix as well as the video matrix and the RGB switch is powered in standby, since the signals between the AUX scart and the TV scart are by-passed in standby, for VCR play-back. In standby, HiFi output carries TV audio if the AUX status voltage is 0; It carries VCR audio if the AUX status voltage is 6 or 12 V.

CPU

The CPU block consists of the microprocessor IC01 (68HC05), the reset circuit IC02 (MC34164) and the EEPROM IC22 (24LC16).

The reset circuit operates on the 5V supply. When the "5 V" reaches 4,33V, the reset IC output goes high, releasing the CPU. During power down, the reset signal goes low again at 4,25 V.

The EEPROM is used for storing information to programme number, for service mode settings, for storing audio frequencies to audio system numbers and for MAC system parameters. It retains all information independent of the power supply.

The main board CPU acts as a portexpander to the MAC CPU, except in standby mode where the whole transcoder module is powered down. The communication with the MAC CPU is through the IIC bus, with the addition of one request line (IUC REQ)

Front panel module

The IR remote control system is based on pulse-position coding (ITT concept) through DC-pulses. The IR diode DC04 converts the IR energy from the transmitter into small voltage pulses which are amplified in IC03 (TDA2800). The output from TDA2800 is software decoded in the CPU. To protect the IR diode and the TDA2800 from electromagnetic fields that can interfere with the IR decoding, metal shields are placed over and under the PCB.

The receiver has 199 programme places, hence three numerical characters are used. The display digits are time multiplexed.

The multiplexed display segments create a 150 Hz current ripple on the 5 V supply. This is avoided by the circuit TP11/TP12, which is a shunt regulator keeping the load on the 5 V supply constant.

The shift registers IC71 and IC72 are port expanders to the main board CPU, they are loaded with data through the IIC-bus when the strobe line SREG STR is active.

Polariser control

The polariser circuit is a current generator keeping the polariser current constant and thus unaffected by the temperature dependent resistance of the polariser. The first half of IB81 (L272) is a voltage amplifier controlled by the CPU through the resistive network RB84–RB86 which restricts the control voltage range to suit the application. Pin 9 is the input reference voltage (5,3V) from the voltage divider RB96/RB95. The second half of L272 is an OP amplifier whose reference voltage is derived from the output of the first OP amplifier through the resistive network RB90/RB94. If the control voltage at pin 8 is exactly 5,3 V = reference, then the voltage on pin 1 will also be 5,3 V as will the input on pin 7 of the second amplifier. As long as an OP amplifier is within its linear operating range, the system will settle so the two inputs have the same voltage. Hence the voltage on pin 6 must be 5,3 V also, meaning that no current can flow through the resistor RB89. If the CPU shifts the control voltage from this equilibrium, the reference voltage on pin 7 will change as must the voltage on pin 6. The second amplifier will now either supply current through RB89 (and thus through the polariser output) or drain current through RB89 depending on the sign of the control voltage shift.

The transistor TB81 will conduct if the current through resistor RB83 increases above about 200 mA, triggering shut-down of the power supply in case of a short circuit to ground of any of the polariser output branches.

Power supply

The power supply is a flyback mode converter, operating at 36 kHz fixed frequency. The filter section CP01/LP07/LP08/LP01 limits the RF interference level injected into the mains, and increases the input immunity to conform with existing EMC regulations.

The 185 to 265 Vrms AC input is rectified by DP01 to a 250–370 Vdc over CP02. During the start-up sequence (receiver connected to the mains), capacitor CP07 is charged from CP02 through RP02 and RP03. When the voltage over CP07 has reached 10 V, the oscillator TP01/TP02 starts. When the power supply is operating, the oscillator is powered from the transformer MP01 through the rectifier DP04.

If there is an overload on any of the secondary outputs, causing the voltage over CP07 to drop below about 8V, the oscillator stops and the power supply goes through the initial start-up sequence again. An overload will thus result in an intermittent mode of operation, keeping the overall power loss and output currents at a safe level.

The oscillator pulses, 10 V high and 1 μ s wide, turns the power mosfet TP04 on. The turn-off of TP04 is controlled by the voltage at the base of TP03. This voltage is the sum of the voltage controlled by the opto coupler IP01 and the voltage drop over RP18, in turn dependent on the current through TP04. When TP03 starts to conduct, the latch circuit TP03/TP05 discharges the gate of TP04 forcing TP04 to turn off.

The secondary output rectifiers delivers 12 V, 23 V and two 5 V outputs. 27 V for tuning is created by the voltage adder circuit CP16/DP16/DP17/LP05/CP19 and the zener diode DP21.

The voltage controlled current generator IP02 keeps the output voltages within close tolerance through the action of the opto coupler IP01.

The receiver has a low power standby mode (approx 5 W), through the transistor switches TP13, TP07 and TP08.

The shut down control can be activated from several parts of the receiver, in case of overload conditions. The operation of the power supply is then temporarily shut down due to high current through the opto coupler, which stops all oscillator pulses to reach the gate of TP04.

LNB voltage supply

TB65 and TB66 are power transistors providing 13,5 V alternatively 18,5 V to the selected LNB input. The LNB voltage from either DB65 or DB66 (and divided by RB75/RB76) is compared with the reference voltage at the emitter of TB69. TB70 is an emitter follower whose base voltage (and thus its emitter voltage) is controlled from the CPU, thus controlling the LNB voltage output.

If the current through RB64 increases above about 0,65 V, transistor TB62 will be triggered. An overload on the LNB will then trigger power supply shut down. The zener diode DB67 provides a hardware current limiting action during change of LNB input (capacive load).

MAC transcoder module

The transcoder module comprises all circuits specific to MAC reception, please see the **block diagram on page 47**. The second smart card reader is mechanically a separate module, but is connected directly to the transcoder module. The switches for card selection is placed on the second card reader module.

The MAC processing is handled in the circuits IM05, IM06 and IM03. MAC teletext and receiver menus is done in IM17 (TPU 2735).

MAC filter

The signal from the main board (= from the tuner module) is MAC de-emphasized base band, and must be filtered before A/D conversion. Low pass filtering (band width 8,5 MHz) is done in LM04/LM05 with surrounding components.

E7

The future HD-MAC transmissions will have an S/N improvement system called E7E implemented. To receive this transmissions in normal MAC quality, E7 processing is needed in the receiver.

E7 (and E7E) is a non linear pre-emphasis/de-emphasis system for video signals, somewhat similar to the Wegener Panda system used for audio.

On the transmitter side, frequencies above 2,5 MHz is filtered out and passed through a circuit where low level signals is amplified more than high level signals, according to a given rule. This improves the detected S/N in the receiver, due to the higher signal energy compared with transmissions without E7 pre-emphasis.

To restore the correct signal, inverse processing must take place in the receiver, after the tuner's FM-detector.

The signal passes two paths, one direct through CM76/RM93, and one through the high pass filter CM58/RM59 to the non-linearity stage IM18. After the non-linearity, the processed high frequency signal components are subtracted from the original signal in TM04. High frequency components is therefore lowered in amplitude, as the rule prescribes.

If E7 is implemented in the transmission, this is signalled to the MAC CPU via an information bit in the MAC data, and the CPU enables the E7 through TM12.

When the E7 is active, the control line "E7-" (from IM03) is high during the data, since E7 might interfere with the data detection.

MAC process

After E7, the signal is clamped for dispersal rejection. TM08 is an emitter follower needed for low impedance

Circuit description 5928 / SAT 2202 CS

drive of CM02. The charge of CM02 is controlled from the CLAMP output of DMA2281, to closely follow the dispersal on the incoming signal but in opposite direction, to level out the dispersal.

A/D conversion is done in IM05, to provide 7 bits of parallel data. This data is first processed in IM06 where the video is de-scrambled if needed.

For receivers with EPROM IM13 labeled 1.08, audio channels in subframe two of the D-MAC signal is extracted by IM06 and sent over the S-bus to the audio processor IM04. D2-MAC audio and D-MAC first subframe audio is extracted by IM03 and sent to IM04 over the S-bus.

For receivers with EPROM IM13 labeled 1.09 and 2.xx, all audio channels are extracted by IM03.

After de-scrambling, the parallel data is processed in IM03 to a form suitable for TV-sets, i.e. 52 us line scanning. The signal, still in form of parallel data, is D/A converted back to analogue signal in IM05. The output from IM05 is analogue RGB, routed to the PAL encoder and receivers main board.

Teletext data transmitted in the VBI (Vertical Blanking Interval) is processed in IM17, and passed as RGB through IM05 where mode selection is done (i.e. picture only, mixed mode or text only). Receiver menus is created by IM17 also.

PAL encoder

IM19 (MC13077) generates S-video (Y and C signals) and CVBS which are routed to the main board video and RGB switches.

The RGB is matrixed in IM19 to the colour difference signals (B-Y and R-Y) and the luminance signal Y. B-Y and

R-Y is quadrature modulated onto 4,43 MHz (the oscillator circuit in IM19 runs on 4*4,43 MHz) to a chrominance signal and band pass filtered in FM01. Due to the group delay in the band pass filter, the luminance signal must be delayed in AM06 with 0,40 us to coincide with the chrominance.

MAC CPU

The MAC CPU handles the communication with the MAC processing IC's over the IM-bus, and all communication with the smart card(s) over a separate bus. Communication with the main board CPU goes over the IIC bus + one request line.

To de-scramble the picture, the de-scrambler DMA 2286 needs a 60 bit long data word, which is valid for a 10,24 s period. This control word is encrypted and transmitted in the MAC signal as an ECM message. Decryption of the ECM is done in the smart card.

The CPU's program is contained in IM13 (EPROM).

Smart card interface

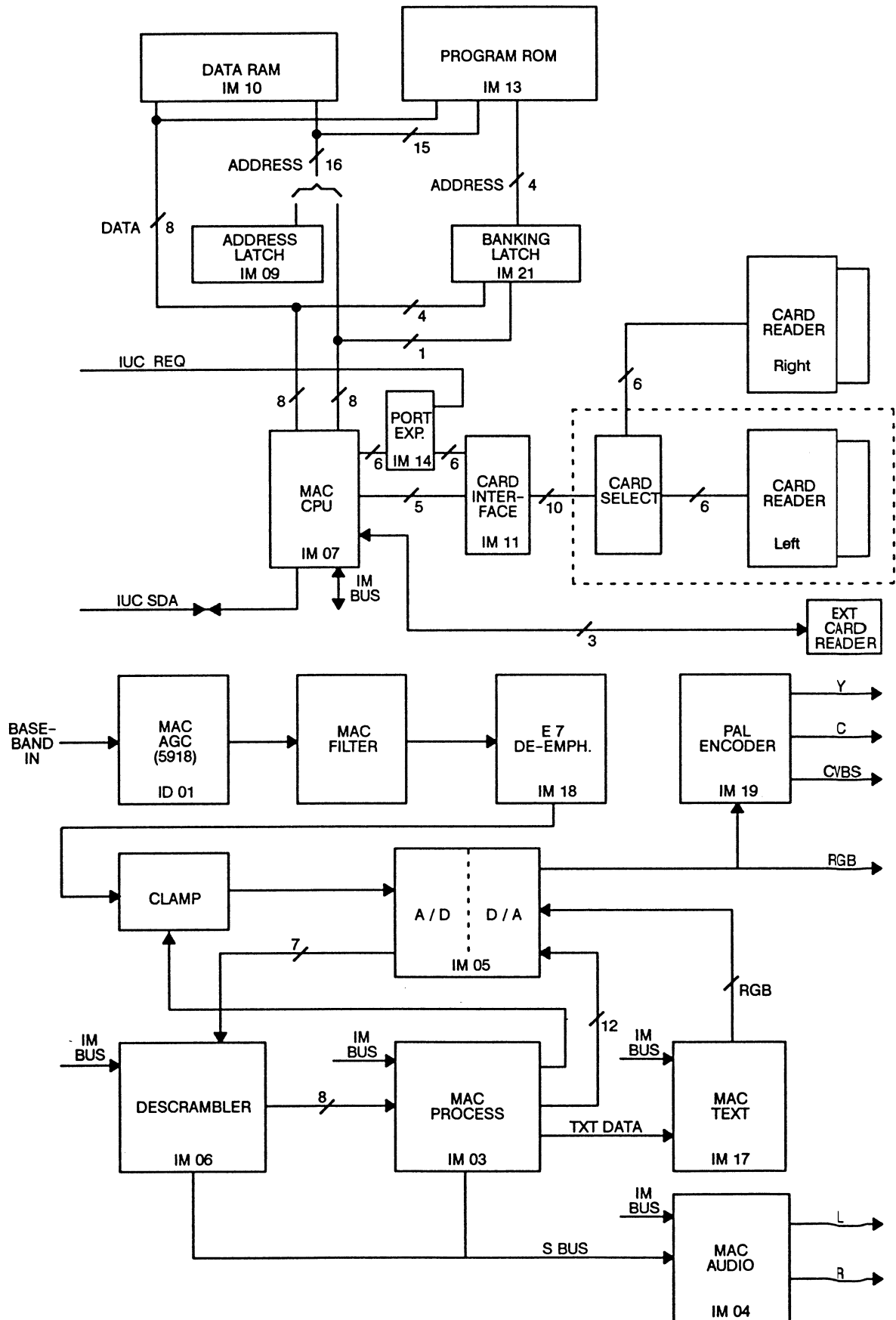
The card interface IM11 provides the programming voltage (Vpp) and Vcc needed for the smart card's operation. TM13, TM14 and IM22 guarantees that the maximum voltage on the clock line and the reset line never becomes higher than the Vcc (to protect the smart card).

DM05, TM02 and TM03 likewise protects the smart cards serial data line.

AM05/IM16-1 is the smart card oscillator needed by the cards internal CPU.

The MAC CPU IM07 controls the smart card interface through a serial link and the port expander IM14.

Block diagram Transcoder Module 5928 / SAT2202CS, 5918 / 3002 CS / SD 5710



Circuit description 5918 / 3002 CS / SD 5710

The main board comprises of front CPU, power supply and scart switches. MAC processing and associated circuits are placed on a transcoder module. The second built-in smart card reader is also placed on its own separate module.

Please refer to the block diagram for overall signal paths and CPU control. Please also use the circuit diagrams for details. This service manual incorporates block diagrams for some individual IC.

Base band video processing

Base band video can be taken from either the TV scart or from the phono base band input connector, selectable in the installation menu. Phono input base band must be PAL de-emphasized. TV scart base band input can be either MAC or non de-emphasized (also selected in the installation menu).

PAL base band from the phono plug is frequency corrected in the network CF47, RF42, RF43 and RF44 to MAC de-emphasized base band, and fed to pins 2 and 3 of IF11 (TEA6415B).

Base band from the TV scart is routed from IF11 to RF21/RF26 (in case of MAC base band in) and the MAC de-emphasis network RF40, CF46, RF41 and RF60 (non de-emphasized base band in). The buffer stage TE81 feeds the transcoder module with the selected signal from pin 1 on IF11.

Video switching

IF11 (TEA 6415B) is a matrix switch with 8 inputs and 6 outputs. Beside the phono base band signal, to the inputs of TEA 6415B are available also video from the TV-scrt, from the AUX-scrt and PAL encoded video from the internal MAC transcoder module. The PAL encoder on the transcoder module is also generating the S-video signals Y and C. Of these, the Y signal is routed to IF11 and the C-signal is routed to the RGB-switch IE11. The video switch is controlled by the CPU over the IIC bus.

If the transcoder module is out of MAC sync, i.e. the signal is not a MAC signal, then the decoder will automatically connect the two scarts together, by-passing all signals. In this way additional decoders or a VCR can be connected to the AUX scart.

If the decoder is installed together with a old type of PAL receiver (like NOKIA 5912/SAT1200S), then the receiver should be connected to the AUX scart and TV to the decoders TV scart. Base band input is to be taken from the phono plug. In this way clear PAL signals from the receiver is automatically by-passed to the TV set.

RGB-switch

Due to the existence of PAL-decoders with menus on RGB only, the 5918 decoder must have an RGB-switch. S-video by-pass from an SVHS recorder is also possi-

ble since the C-signal is carried on pin 15 (same as the R-signal) in the scart.

The inputs of IE11 are thus RGB and C from the MAC transcoder module and RGB from the AUX scart. The output goes to the TV scart pins 7, 11 and 15.

Audio switch

All audio signals are routed to the audio matrix switch IA71 (TEA 6420): MAC audio from the transcoder module, audio from the TV-scrt and from the AUX-scrt. The outputs are audio to the TV-scrt/RF-modulator and to the AUX -scrt.

The switching is controlled by the CPU over the IIC bus. The audio matrix as well as the video matrix and the RGB switch is powered in standby, since the signals between the AUX scart and the TV scart must be by-passed in standby.

CPU

The CPU block consists of the microprocessor IC01 (68HC05), the reset circuit IC02 (MC34164) and the EEPROM IC22 (24LC16).

The reset circuit operates on the 5V supply. When the "5 V" reaches 4,33 V, the reset IC output goes high, releasing the CPU. During power down, the reset signal goes low again at 4,25 V.

The EEPROM is used for service mode settings. It retains all information independent of the power supply.

The main board CPU acts as a port expander to the MAC CPU, except in standby mode where the whole transcoder module is powered down. The communication with the MAC CPU is through the IIC-M bus, with the addition of one request line (IUC REQ)

Front panel module

The IR remote control system is based on pulse-position coding (ITT concept) through DC-pulses. The IR diode DC04 converts the IR energy from the transmitter into small voltage pulses which are amplified in IC03 (TDA2800). The output from TDA2800 is software decoded in the CPU. To protect the IR diode and the TDA2800 from electromagnetic fields that can interfere with the IR decoding, metal shields are placed over and under the PCB.

The shift registers IC71 and IC72 are port expanders to the main board CPU, they are loaded with data through the IIC-bus when the strobe line SREG STR is active.

Power supply

The power supply is a flyback mode converter, operating at 36 kHz fixed frequency. The filter section CP01/LP07/LP08/LP01 limits the RF interference level injected into the mains, and increases the input immunity to conform with existing EMC regulations.

The 185 to 275 Vrms AC input is rectified by DP01 to a 250-380 Vdc over CP02. During the start-up sequence

(decoder connected to the mains), capacitor CP07 is charged from CP02 through RP02 and RP03. When the voltage over CP07 has reached 10 V, the oscillator TP01/TP02 starts. When the power supply is operating, the oscillator is powered from the transformer MP01 through the rectifier DP04.

If there is an overload on any of the secondary voltages, causing the voltage over CP07 to drop below about 8V, the oscillator stops and the power supply goes through the initial start-up sequence again. An overload will thus result in an intermittent mode of operation, keeping the overall power loss and output currents at a safe level.

The oscillator pulses, 10 V high and 1 μ s wide, charges the gate of the power mosfet TP04. The turn-off of TP04 is controlled by the voltage at the base of TP03. This voltage is the sum of the voltage controlled by the opto coupler IP01 and the voltage drop over RP18, in turn dependent on the current through TP04. When TP03 starts to conduct, the latch circuit TP03/TP05 discharges the gate of TP04 forcing TP04 to turn off.

The secondary output rectifiers delivers 12 V, 23 V and two 5 V outputs.

The voltage controlled current generator IP02 keeps the output voltages within close tolerance through the action of the opto coupler IP01.

The decoder has a low power standby mode (approx 5 W), through the transistor switches TP13, TP07 and TP08.

The shut down control can be activated from several parts of the decoder, in case of overload conditions. The operation of the power supply is then temporarily shut down due to high current through the opto coupler, which stops all oscillator pulses to reach the gate of TP04.

MAC transcoder module

See block diagram on page 47.

The transcoder module comprises all circuits specific to MAC reception, please see the block diagram. The second smart card reader is mechanically a separate module, but is connected directly to the transcoder module. The switches for card selection is placed on the second card reader module.

The MAC processing is handled in the circuits IM05, IM06 and IM03. MAC teletext and receiver menus is done in IM17 (TPU 2735).

AGC

The AGC circuit (used in 5918 free-standing MAC decoder only) is a discrete VCA (Voltage Controlled Amplifier) built around the transistor array ID01 (LM3046), please see the rearranged diagram on page 48 for clarity. The balanced amplifier output is taken from one of

the collectors. The signal amplitude is dependent on the current flowing through the transistor, in turn affected by the DC voltage on pin 4 (the other base is connected to a reference voltage). The signal input is connected to the common emitter through the emitter transistor, hence the gain is controlled by the DC voltage at pin 4. This control voltage is derived from the DMA2281's AGC output, and amplified in ID02. The VCA has ± 6 dB control range.

MAC filter

The signal from the main board (= from the tuner module) is MAC de-emphasized base band, and must be filtered before A/D conversion. Low pass filtering (band width 8,5 MHz) is done in LM04/LM05 with surrounding components.

E7

The future HD-MAC transmissions will have an S/N improvement system called E7E implemented. To receive this transmissions in normal MAC quality, E7 processing is needed in the receiver.

E7 (and E7E) is a non linear pre-emphasis/de-emphasis system for video signals, somewhat similar to the Wegener Panda system used for audio.

On the transmitter side, frequencies above 2,5 MHz is filtered out and passed through a circuit where low level signals is amplified more than high level signals, according to a given rule. This improves the detected S/N in the receiver, due to the higher signal energy compared with transmissions without E7 pre-emphasis.

To restore the correct signal, inverse processing must take place in the receiver, after the tuner's FM-detector.

The signal passes two paths, one direct through CM76/RM93, and one through the high pass filter CM58/RM59 to the non-linearity stage IM18. After the non-linearity, the processed high frequency signal components are subtracted from the original signal in TM04. High frequency components is therefore lowered in amplitude, as the rule prescribes.

If E7 is implemented in the transmission, this is signalled to the MAC CPU via an information bit in the MAC data, and the CPU enables the E7 through TM12.

When the E7 is active, the control line "E7-" (from IM03) is high during the data, since E7 might interfere with the data detection.

MAC process

After E7, the signal is clamped for dispersal rejection. TM08 is an emitter follower needed for low impedance drive of CM02. The charge of CM02 is controlled from the CLAMP output of DMA2281, to closely follow the dispersal on the incoming signal but in opposite direction, to level out the dispersal.

Circuit description 5918 / 3002 CS / SD 5710

A/D conversion is done in IM05, to provide 7 bits of parallel data. This data is first processed in IM06 where the video is de-scrambled if needed.

For receivers with EPROM IM13 labeled 1.08, audio channels in subframe two of the D-MAC signal is extracted by IM06 and sent over the S-bus to the audio processor IM04. D2-MAC audio and D-MAC first sub-frame audio is extracted by IM03 and sent to IM04 over the S-bus.

For receivers with EPROM IM13 labeled 1.09 and 2.xx,
all audio channels are extracted by IM03.

After de-scrambling, the parallel data is processed in IM03 to a form suitable for TV-sets, i.e. 52 us line scanning. The signal, still in form of parallel data, is D/A converted back to analogue signal in IM05. The output from IM05 is analogue RGB, routed to the PAL encoder and receivers main board.

Teletext data transmitted in the VBI (Vertical Blanking Interval) is processed in IM17, and passed as RGB through IM05 where mode selection is done (i.e. picture only, mixed mode or text only). Receiver menus is created by IM17 also.

PAL encoder

IM19 (MC13077) generates S-video (Y and C signals) and CVBS which are routed to the main board video and RGB switches.

The RGB is matrixed in IM19 to the colour difference signals (B-Y and R-Y) and the luminance signal Y. B-Y and R-Y is quadrature modulated onto 4.43 MHz (the oscillator circuit in IM19 runs on 4x4.43 MHz) to a chromi-

nance signal and band pass filtered in FM01. Due to the group delay in the band pass filter, the luminance signal must be delayed in AM06 with 0,40 us to coincide with the chrominance.

MAC CPU

The MAC CPU handles the communication with the MAC processing IC's over the IM-bus, and all communication with the smart card(s) over a separate bus. Communication with the main board CPU goes over the IIC bus + one request line.

To de-scramble the picture, the de-scrambler DMA 2286 needs a 60 bit long data word, which is valid for a 10,24 s period. This control word is encrypted and transmitted in the MAC signal as an ECM message. Decryption of the ECM is done in the smart card.

The CPU's program is contained in IM13 (EPROM).

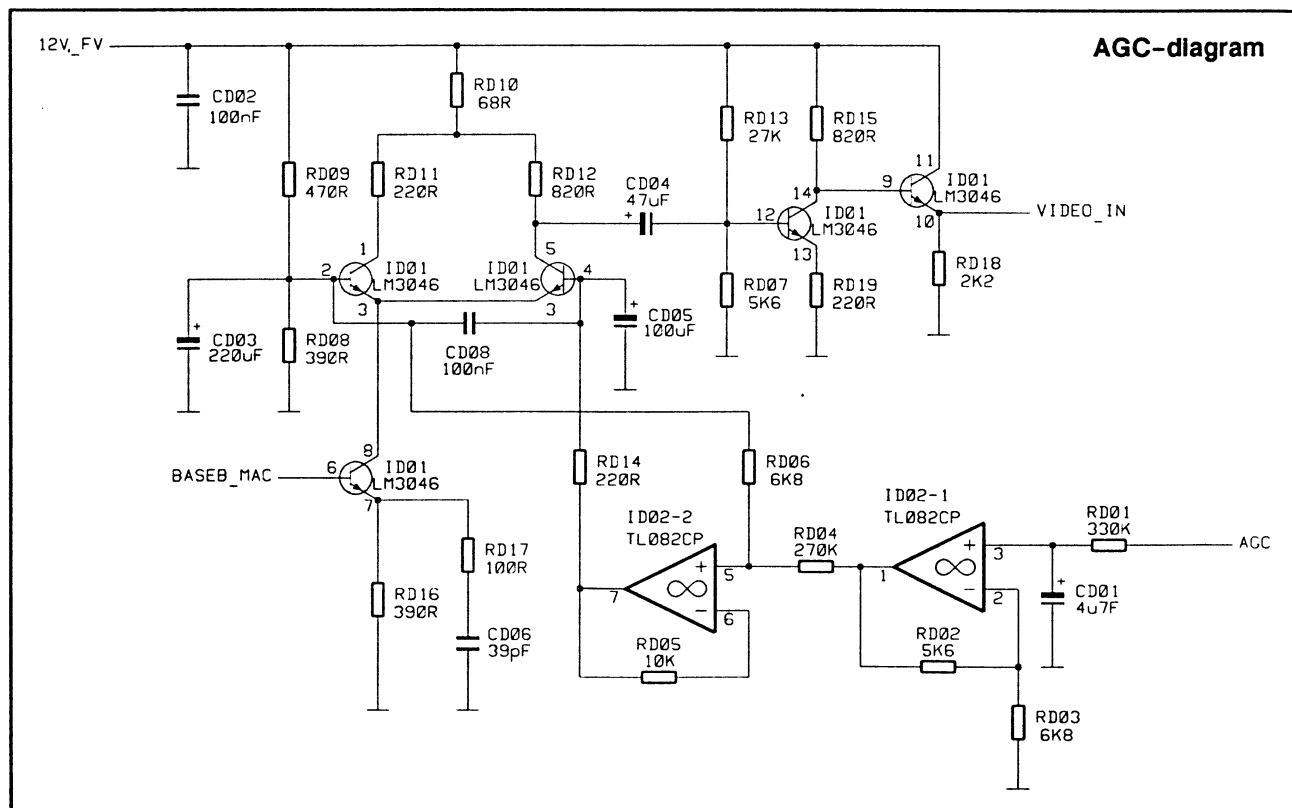
Smart card interface

The card interface IM11 provides the programming voltage (V_{pp}) and V_{cc} needed for the smart card's operation. TM13, TM14 and IM22 guaranties that the maximum voltage on the clock line and the reset line never becomes higher than the V_{cc} (to protect the smart card).

DM05, TM02 and TM03 likewise protects the smart cards serial data line.

AM05/IM16-1 is the smart card oscillator needed by the cards internal CPU.

The MAC CPU IM07 controls the smart card interface through a serial link and the port expander IM14.



Trimningsguide, mjukvara

Denna satellitmottagare eller dekoder kontrolleras av två processorer, Motorola 68HC05D9 och Philips 83C654.

I enheten är allting rörande IR-avkodning, avstämningskontroll och OSD-behandling styrt av processorema.

I service läget är det möjligt att vid PAL-signal ställa in Videoförstärkningen för PAL BB, MAC BB och PAL CVBS.

13 och 18 V inställningen kan justeras för att kompensera för långa kablar.

"Volym" och en "Option byte" kan ställas in.

Det är också möjligt att ändra den förinställda "hemliga" koden.

I dekodem kan endast Option byte: button 6 "Cable net version" ställas in.

Samtliga justeringsarbeten skall göras vid 220 / 240 V nätspänning.

Trimnings- och justeringsanvisning PAL-inställningar

Inställning av Videoförstärkning (endast mottagare)

- Anslut en TV-mottagare till TV-SCART kontakten.
- Välj en satellitkanal som sänder i PAL med 16 MHz deviation t ex 3 SAT på ASTRA 1A.
- Gå in i menyläge & "Channel Programming" och kontrollera att Video level är ställd i **High**. Om inte ändra till detta läge.
- Anslut ett 75 ohms motstånd mellan pin 19 och pin 17 i AUX-SCART- kontakten (pin 19 Video ut, pin 17 Video ut jord).
- Anslut ett oscilloskop till 75 ohmsmotståndet.
- **Gå in i Service läge genom att trycka på följande knappar i en följd**



- Välj **RECEIVER SETUPS** med **FP +/–**.
- Stega fram till CVBS med **P–**. Justera nivån med **FP +/–** tills signalen är 1 V mellan synktopt och peak vitt.
- Stega med **P+** till BB MAC. Ställ in samma siffror som inställdes för CVBS.
- Stega till BB PAL. Ställ in samma siffror som inställdes för CVBS.
- Gör eventuellt övriga inställningar i denna meny.
- Tryck på **STORE** för att spara inställningarna.
- Tryck på **TV/SAT** för att lämna serviceläget.

MAC-inställningar

- Välj en D-MAC eller D2-MAC-sändande kanal. Denna bör sända testbild av något slag, helst av typen färgbalkar. Om inte detta kan erhållas väljs en stillastående bild t ex en programtablå.
- Gå in i Service läge. Välj **MAC SETUPS**.
- Tryck på **MENU** för att växla mellan helbild / eller endast vald rad i MAC SETUPS menyn.
- **VCO:** Justera med **FP +/–** knapparna till stabilaste bild. Tryck på **STORE**.
- **Brightness:** Anslut oscilloskopet till någon av RGB-utgångarna på TV-SCART-kontakten över 75 ohm. Ställ in oscilloskopet så att helbild visas. Stega med **P–** till Brightness. Justera med **FP +/–** så att klippnivån är strax under svartnivån, dock utan att påverka svartnivån. Du kan se detta som att klippnivån just ska tangera det "brus" som finns omedelbart under svartnivån. En korrekt inställning ska nu (via RGB) återge TV-bilden med en naturlig ljusstyrka.

Vid problem med insynkning på MAC-kanaler (mest D-MAC) kan slice level justeras.

- **Slice level:** Stega till Slice level med **P +/–** och justera med **FP +/–** tills Bit error: (tre siffror längst ned till höger i menyn) är så låg som möjligt. Tryck på **STORE**.

Då minnesfunktionen gått förlorad gör du så här.

- Gå in i serviceläge. Välj **MAC SETUPS**. Tryck på **-/--/---** och fabriksinställda standardvärden laddas in.
- Justera **VCO** och glöm inte att trycka på **STORE** innan serviceläget lämnas med **TV/SAT**.

Service mode, Software

Alignment guide software

The satellite receiver or decoder is controlled by two processors, Motorola 68HC05D9 and Philips 83C654. Everything in this unit concerning IR-decoding, tuning control and OSD handling is controlled by the processors.

In the service menu it is possible to set the Video gain for PAL BB, MAC BB, and PAL CVBS.

You can also adjust the 13 and 18 V to compensate for long leads.

Volume and an option byte can also be programmed. It is also possible to change the secret code.

In the decoder unit only button 6 "Cable net version" can be set in Option byte:

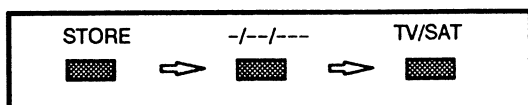
All adjustments shall be carried out with 220 / 240 V mains voltage.

Adjustment and alignment instructions

Adjustment of the Video gain.

PAL adjustments

- Connect a TV-set to the TV-SCART connector.
- Select a satellite channel transmitting a PAL signal with 16 MHz deviation e.g. 3 SAT on ASTRA 1 A.
- Select the menu mode & Channel Programming. Check that "High" video level has been selected. If not, adjust to that level.
- Connect a 75 ohm termination between pin 19 and pin 17 in the AUX-SCART connector (pin 19 Video out, pin 17 Video out ground).
- Connect an oscilloscope to the 75 ohm termination.
- To enter service mode, press the following buttons in the order shown:



- Select RECEIVER SETUPS with FP +/-.
- Step to CVBS with P-. Adjust the level with FP + / FP- until the signal is 1 V between the sync top and peak white.
- Step to BB MAC with P+. Adjust to the same setting as for CVBS.
- Step to BB PAL with P+. Adjust to the same setting as for CVBS.
- Perform any other adjustments in this menu.
- Press STORE to save the adjustments.
- Press TV/SAT to exit from service mode.

MAC adjustments

- Select a channel transmitting a D-MAC or D2-MAC signal. This should be some form of test card, preferably of the colour bar type. If this is not available, find a still picture, such as a programme listing.
- Enter "Service mode". Select **MAC SETUPS**.
- Press **MENU** to change between a full picture or only selected line in the MAC SETUPS menu.
- **VCO**: Adjust for maximum picture stability with the FP +/- buttons. Press **STORE**.
- **Brightness**: Connect the oscilloscope to one of the RGB outputs of the TV SCART connector across 75 ohm. Set the oscilloscope to display a full picture. Step to Brightness with P-. Adjust with FP +/- so that the clipping level is just below the black level, but without affecting the black level. This is shown by the clipping level just touching the "noise" which is immediately below the black level. A correctly set-up TV should now (via RGB) reproduce the picture with a natural brightness.

If sync problem on MAC channels (mostly D-MAC), slice level can be adjusted.

- **Slice level**: Step to Slice level with P +/-. Adjust with FP +/- until Bit error: (three digits down in the right corner of the menu) is as low as possible. Press **STORE**.

This is **what to do when information is lost** from the memory:

- Enter service mode. Select MAC SETUPS. Press -/--/--- to load the factory settings.
- Adjust **VCO**. Remember to press **STORE** before pressing **TV/SAT** to exit from service mode.

Justieranleitung, Software

Der Satelliten-Empfänger oder Dekoder wird gesteuert durch zwei Prozessoren, Motorola 68HC05D9 und Philips 83C654.

Er steuert die Dekodierung der Infrarot-Signale, die Abstimmung und die Bildschirmeinblendung (OSD).

Im Service-Menü kann die VIDEO-Verstärkung für PAL BB, MAC BB und PAL CVBS eingestellt werden.

Ebenso können 13 und 18 Volt, wenn erforderlich, justiert werden zur Kompensation für lange Leitungen.

Die Lautstärke sowie einige Einstellungen im "Option byte", z.B. 13/18 V Abschaltung, lassen sich programmieren.

Nur im Dekoder kann mit Taste 6 im Option byte "Kabelnetz-Version" gesetzt werden.

Es ist auch möglich, den Geheim-Code zu ändern.

Alle Einstellungen sollen bei 220 / 240 Volt Wechselspannung erfolgen.

Justier- und Abgleichanweisung

Abgleich der VIDEO-Verstärkung

PAL-Einstellungen

- Ein Fernsehgerät an die Buchse TV-SCART anschließen.
- Einen Satelliten-Kanal mit einem PAL-Signal von 16 MHz Hub (Astra), z.B. 3 SAT auf ASTRA 1A, wählen.
- Das Menü für die Kanal-Programmierung wählen. Darauf achten, daß der Video-Pegel "High" eingestellt ist, andernfalls auf diesen Pegel einstellen.
- Einen 75 Ohm-Widerstand zwischen Stift 19 und Stift 17 der Buchse AUX-SCART anschließen (Stift 19 = Video-Ausgang, Stift 17 = Video-Ausgang-Masse).
- Das Oszilloskop an den 75 Ohm Widerstand anschließen.
- Um in den Service-Mode zu gelangen, drücken Sie die folgenden Tasten in der gezeigten Reihenfolge.



- RECEIVER SETUPS wählen mit Taste FP +/-.
- Mit Taste P- CVBS einstellen. Den Signal-Pegel mit FP +/FP- auf 1 Volt zwischen Spitzenwert des Sync.-Impulses und Spitzenweiß justieren.
- Mit Taste P+ zur Zeile BB MAC weiterschalten. Justage wie bei CVBS.
- Mit Taste P+ zur Zeile BB PAL weiterschalten. Justage wie bei CVBS.

- Eventuell weitere Justagen vornehmen.
- Abschließend die Taste **STORE** drücken zum Speichern der Einstellungen.
- Taste **TV/SAT** drücken zum Verlassen des Service-Modes.

MAC-Einstellungen

- Kanal wählen, der D-MAC oder D2-MAC-Signal aussendet. Es sollte sich um eine Art Testbild handeln, vorzugsweise der Farbbalkentyp. Wenn dies nicht möglich ist, Video-Einzelbild, wie z.B. Programmliste, wählen.
- Service-modus einschalten. **MAC SETUPS** wählen.
- Taste **MENU** drücken zum Umschalten zwischen dem Vollbild oder nur einer gewählten Zeile im MAC-Einstellmenü.
- **VCO**: Auf Service-modus schalten. Maximale Bildstabilität mit FP +/ - Tasten einstellen. Taste **STORE** drücken.
- **Brightness**: Oszilloskop mit einem der RGB-Ausgänge der TV-SCART-Steckverbindung über 75 Ohm anschließen. Oszilloskop so einstellen, daß ganzes Bild angezeigt wird. Mit P- zu Brightnes weiterschalten. So regulieren mit FP +/ -, daß die Begrenzungslinie knapp unter dem Schwarzniveau liegt, dieses aber nicht beeinträchtigt. Dies ist daran zu erkennen, daß die Begrenzungslinie gerade die Rauschgrenze berührt, die direkt unterhalb des Schwarzniveaus liegt. Ein korrekt eingestellter Fernsehgerät sollte nun (über RGB) das Bild mit natürlicher Helligkeit wiedergeben.

Bei Synchronisationsproblemen auf MAC-Kanälen (meistens bei D-MAC) kann die Daten-Triggerschwelle justiert werden.

- **Slice level**: (Daten-Triggerschwelle) Mit Taste P +/ - auf "Slice level" schalten. Mit Taste FP +/ - den Übertragungsfehler (3 Stellen nach unten in der rechten Ecke des Menüs) möglichst klein einstellen. Taste **STORE** drücken.

Folgende Schritte sind erforderlich, wenn Daten aus dem Speicher verloren gegangen sind:

- Service-Modus einschalten. **MAC SETUPS** wählen. -/--/--- drücken, um Werkseinstellungen zu laden.
- **VCO** einstellen. Nicht vergessen, **STORE** zu drücken, bevor mit **TV/SAT** der Service-modus verlassen wird.

SERVICE MENU

RECEIVER SETUPS

MAC SETUPS

FP +/- to select
 P +/- to move

RECEIVER SETUPS			
Adjustment name		preset	now
Video gain:	BB PAL:	32	32
	BB MAC:	32	32
	CVBS:	32	32
13V:		47	47
18V:		15	15
Volume:		3	3
Option byte:	00110001	00110001	X)
Change code:	1234	1234	

0 ... 63
 0 ... 63
 0 ... 63
 0 ... 63
 0 ... 63
 0 ... 3

Press STORE to save changes

X) Options:

Use number buttons 0 – 7 to select

button 0 = 2000 MHz tuner	'1' = Yes (rightmost on screen)
button 1 = Selectable BW tuner	'1' = Yes
button 2 = Magn. polariser	'1' = No
button 3 = One input tuner	'1' = One input
button 4 = LNB power on	'1' = On
button 5 = Not used	
button 6 = Cable net version	'1' = Yes (take away automatic messages on screen)
button 7 = Not used	(leftmost on screen)

Trimningsguide mjukvara MAC Alignment guide, MAC software Justierungsanleitung, MAC-Software

Sida 1
Page 1
Seite 1

MAC SETUPS			
VCO	DMA 14	128	122
EDC	DMA 198	56	56
PLL gain	DMA 199	0	0
Slice level	DMA 199	36	36
Color Vsat	DMA 23	23	23
Color Usat	DMA 23	16	16
Luma delay	DMA 200	12	12
Contrast	DMA 200	27	27
Blank delay	DMA 202	48	48
Sync delay	DMA 202	62	62
Brightness	VCU 16	127	87
VCU flags	VCU 16	188	188
Red drive	VCU 17	112	112
Red cutoff	VCU 17	100	100
Green drive	VCU 18	112	112
Green cutoff	VCU 18	100	100
Blue drive	VCU 19	112	112
Blue cutoff	VCU 19	100	100
Bit pattern:	00000100		11110011
White level:	216	Frame:	003E38A
Black level:	55	Bit error:	238
Front: 3	MAC 2.01		
Press STORE to save changes			

Sida 2
Page 2
Seite 2

MAC SETUPS			
OSD contrast	VCU 27	17	17
Volume	K 34	24	24
Text delay	TPU	14	14
~			
Bit pattern:	00000100		00011000
White level:	216	Frame:	000354
Black level:	55	Bit error:	238
Front: 3	MAC 2.01		
Press STORE to save changes			

Front-processor IC01

MAC-programme IM13

- x) Preset = förinställda värden
 Now = ställs in efter trimning
 Preset = preset values
 Now = to be set after alignment
 Preset = voreingestellte Werte
 Now = Einstellung nach der Justierung

Instruktion för Snabbprogrammerare "Quick loader" 262 5342

Gäller endast för 5928 / SAT2202 Serie 2 -

- Dra ur nätkabeln.
- Anslut kabel från snabbprogrammeraren till kortläsarekontakten på bakpanelen.
- Anslut nätkabeln. På mottagarens display visas "dP".
- Tryck på **P +** knappen på frontpanelen.
- På displayen visas "in". "Er" på displayen betyder att det är en oprogrammerad (tom) snabbprogrammerare som användes.
- När "oc" visas på displayen är programmeringen färdig.
- Dra ur nätkabeln. Tag bort kabeln från kortläsarekontakten.

OBS! Omvänd programmering.

- För att ladda snabbprogrammeraren från en satellit-mottagare, tryck på **"STORE + -/--/--- + TV/SAT"** på fjärrkontrollen när displayen visar "dP". På displayen visas nu "out".
- När "oc" visas på displayen är programmeringen färdig.

Varning!

Denna programmering förstör det ursprungliga innehållet i snabbprogrammeraren.

Instruction for Fast programmer "Quick loader" 262 5342

Valid only for 5928 / SAT 2202 Serial 2 -

- Unplug the mains lead.
- Connect the cable from the Fast programmer to the Card reader connection on the rear panel.
- Connect the mains lead. "dP" appears on the display.
- Press **P +** on the front panel.
- "in" appears on the display. When "Er" appears it means that a non-programmed (empty) Fast programmer is used.
- "oc" appears when the programming is done.
- Unplug the mains lead. Unplug the cable from the Card reader connector.

Note! Inverted programming

- To load the Fast programmer from the satellite receiver, press **STORE + -/--/--- + TV/SAT** on the remote control when "dP" appears on the display. By now "out" appears on the display.
- "oc" appears when the programming is done.

Warning!

This programming will destroy the original contents in the Fast programmer.

Anleitung für Schnellprogrammierer "Quick loader" 262 5342

Gültig nur für SAT2202 / 5928 Serie 2 -

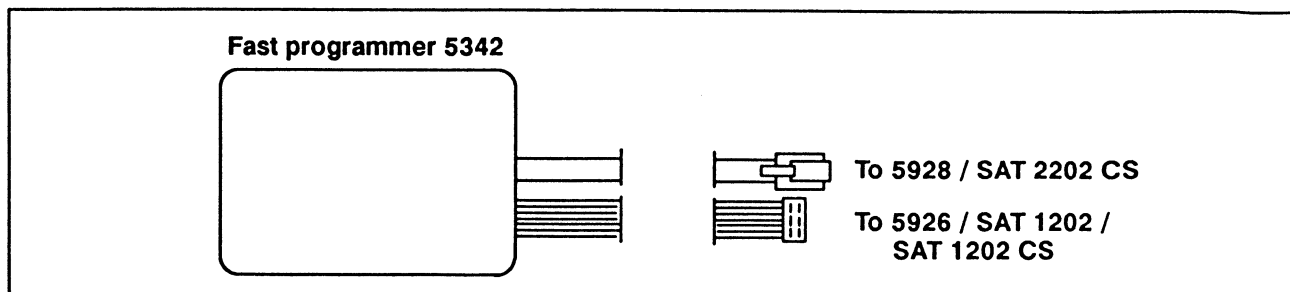
- Den Netzstecker herausziehen.
- Das Kabel des Schnellprogrammierers an den Kartenlesegeräteanschluß auf der Rückseite anschließen.
- Das Netzkabel anschließen. "dP" erscheint auf dem Display.
- Die Taste **P +** des Bedientells drücken.
- "in" erscheint auf dem Display. Wenn "Er" erscheint, ist der Schnellprogrammierer nicht programmiert.
- "oc" erscheint nach erfolgter Programmierung.
- Den Netzstecker herausziehen. Das Kabel von dem Kartenlesegeräteanschluß abziehen.

Achtung! Umgekehrte Programmierung

- Zum Programmieren des Schnellprogrammierers vom Satelliten-Empfänger aus, die Tasten **STORE, -/--/---** und **TV/SAT** der Fernbedienung drücken. Es erscheint "dP" auf dem Display, danach "out".
- "oc" erscheint nach erfolgter Programmierung.

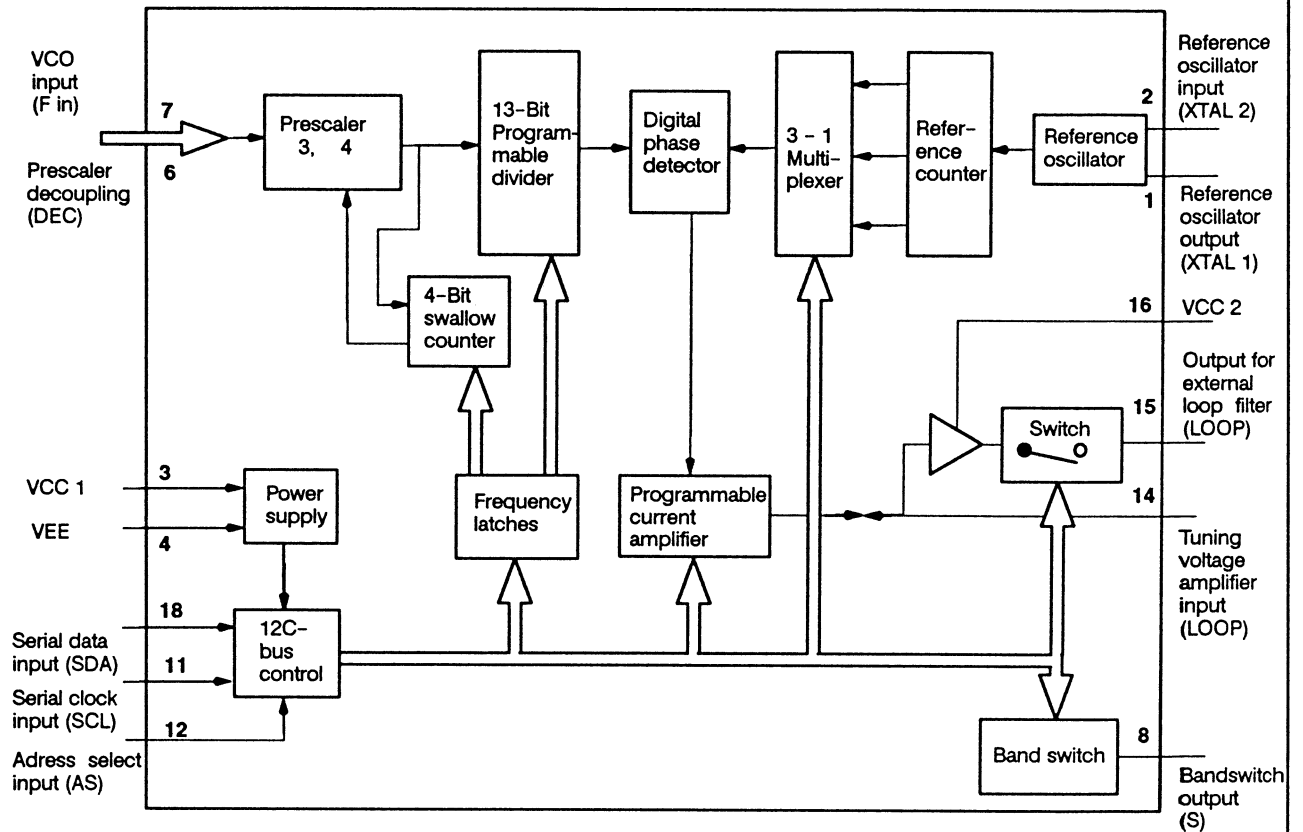
Warnung!

Diese Programmierung verändert die Original-Programmierung des Schnellprogrammierers.



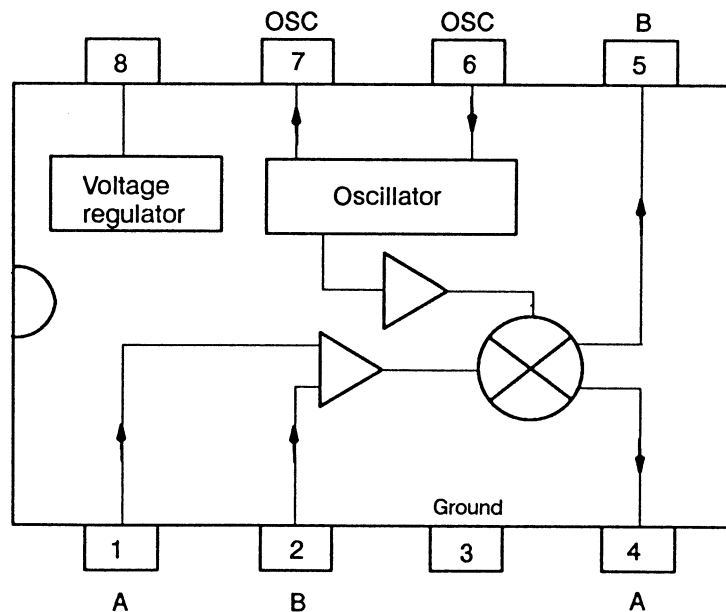
Main PC Board: Block diagram IA 21 TDA 8735

PLL frequency synthesizer



Main PC Board: PAL Sound Block: Block diagram IA 31 NE 612

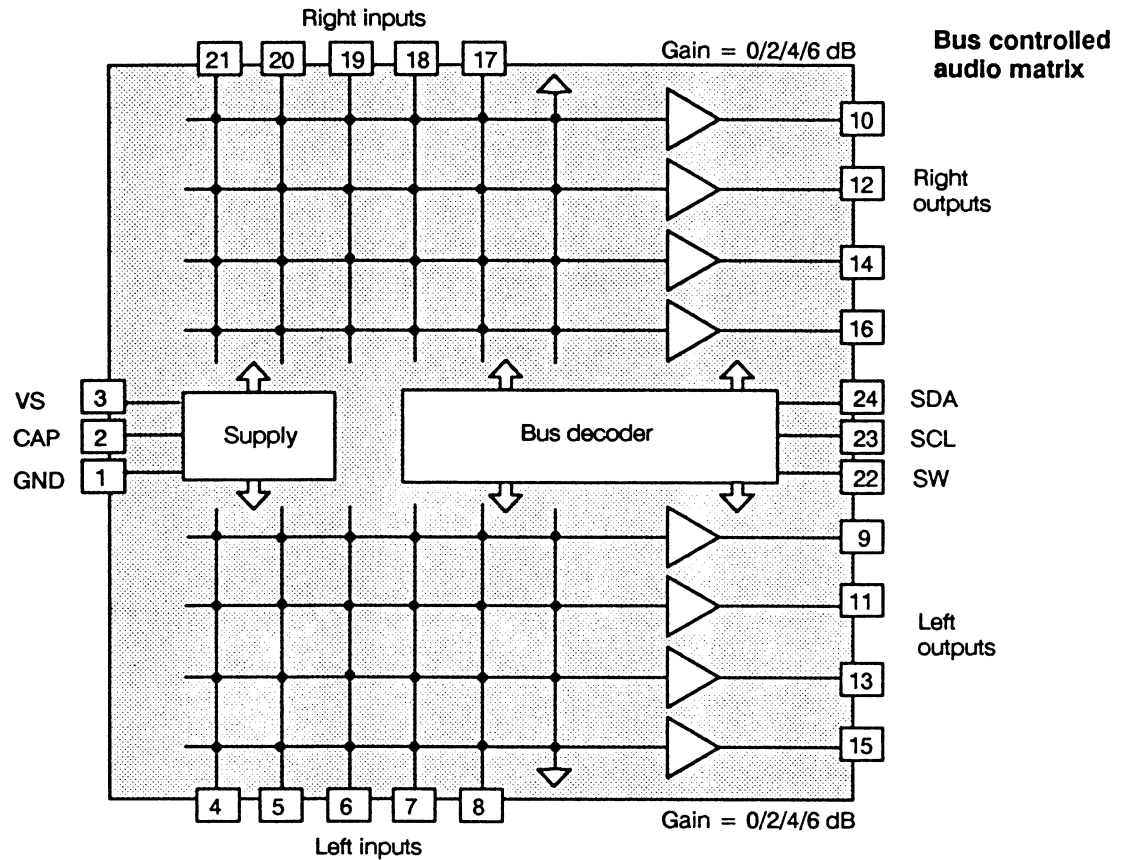
Double-Balanced Mixer and Oscillator
64 00082-01



Block diagram

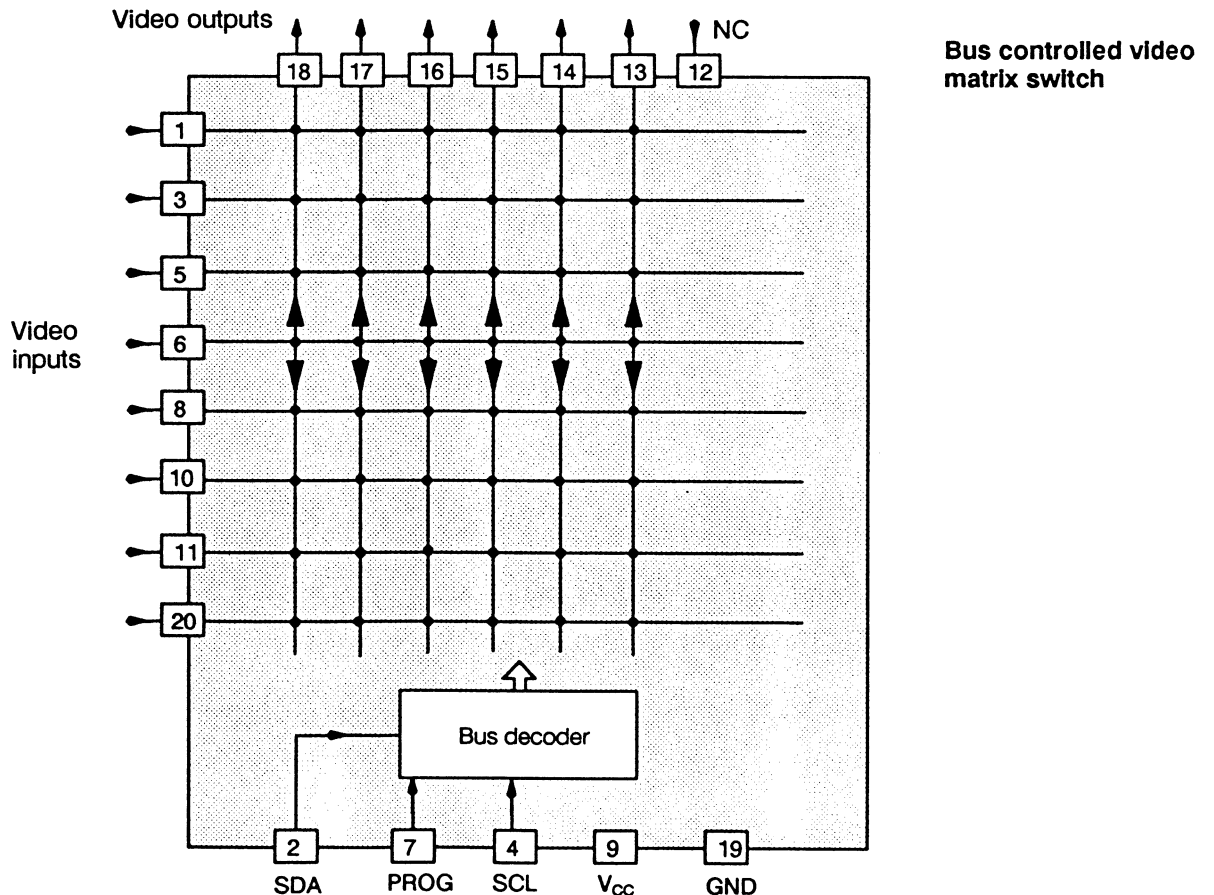
Main PC Board: PAL Sound Block:

Block diagram IA 71 TEA 6420

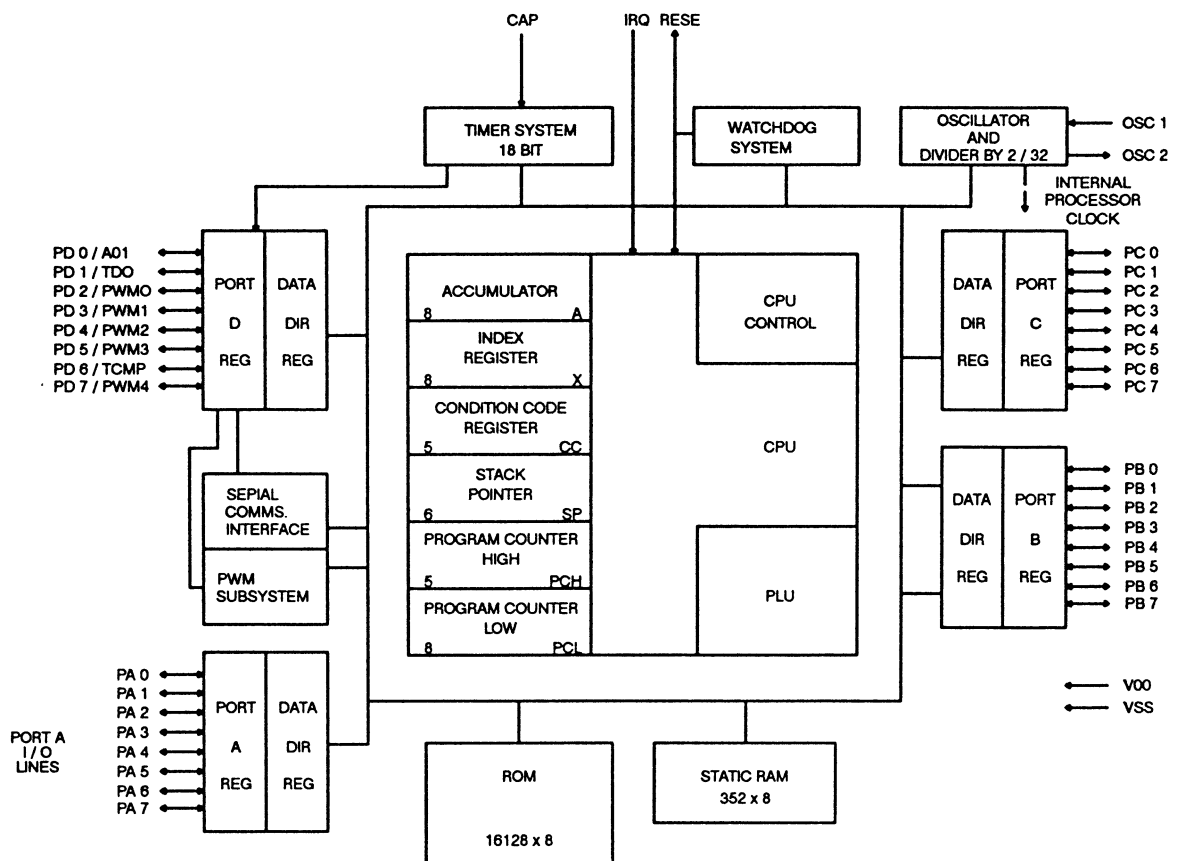


Main PC Board: Video Block:

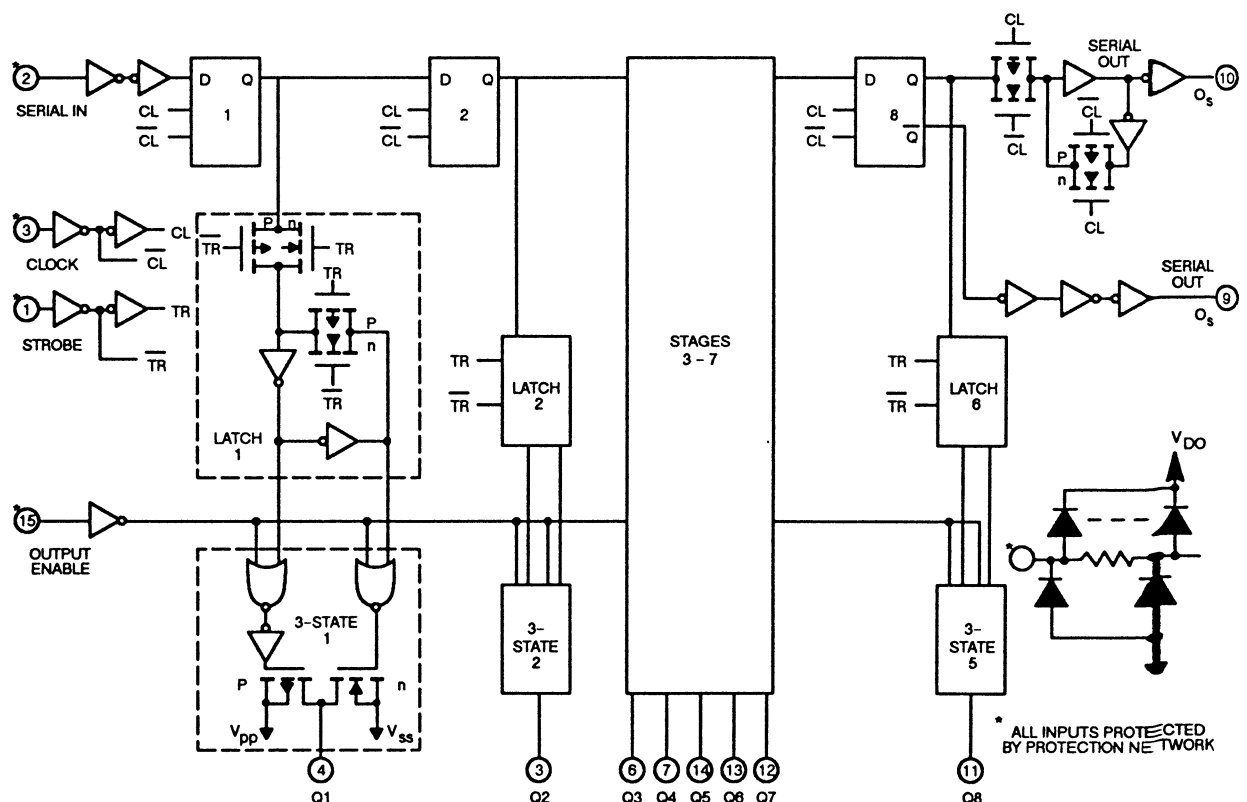
Block diagram IE 11, IF 11 TEA 6415 B



Main PC Board: Block Diagram IC 01 MC 68HC05 Processor

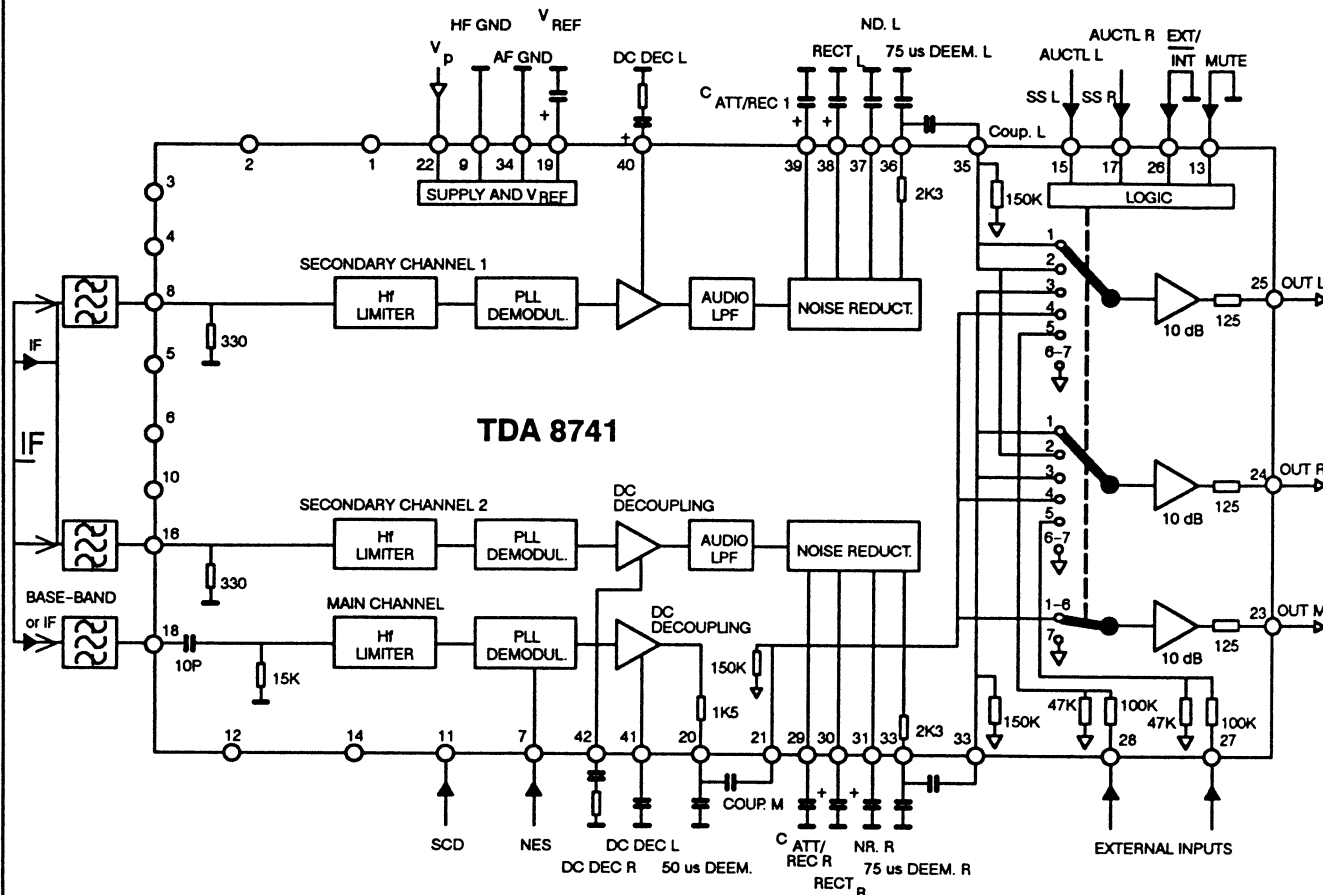


Main PC Board: Block Diagram IC71, IC 72 4094.

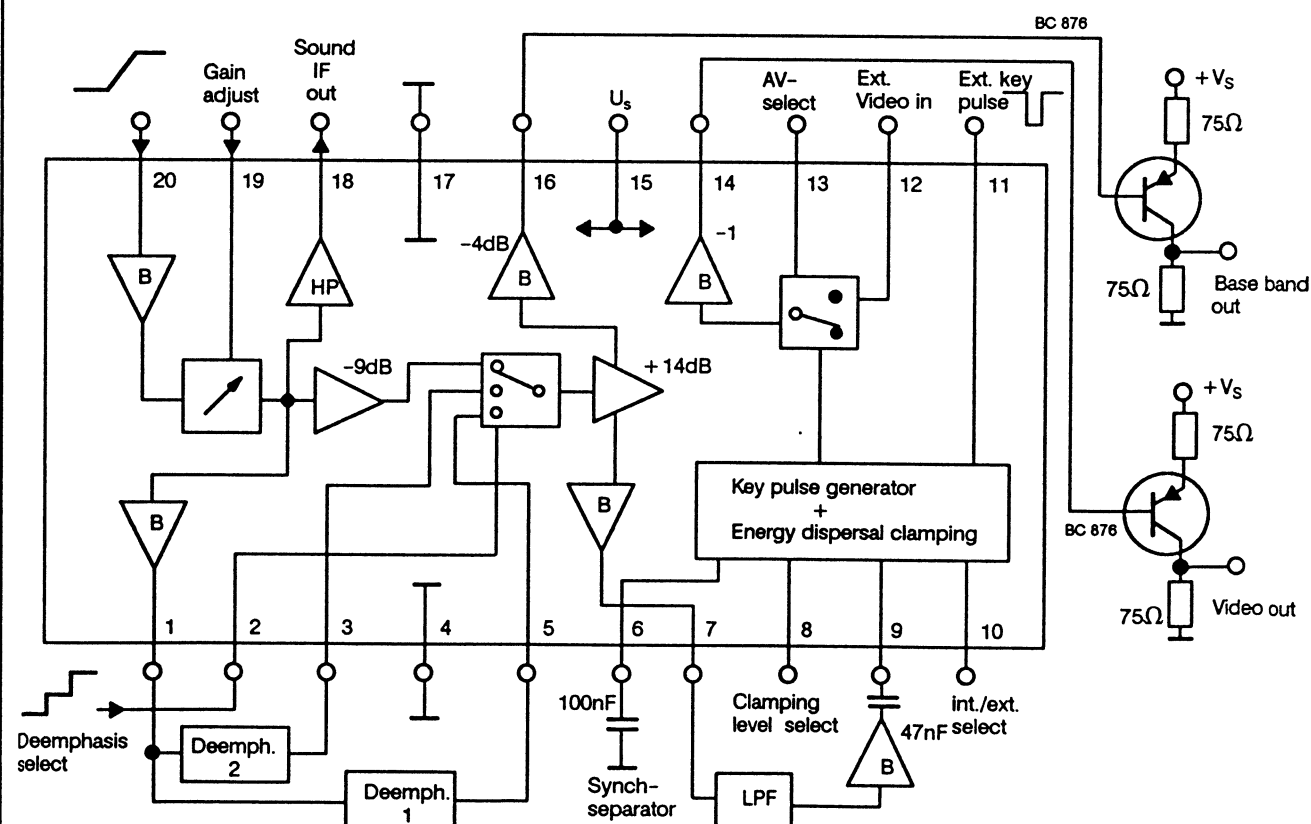


Block diagram

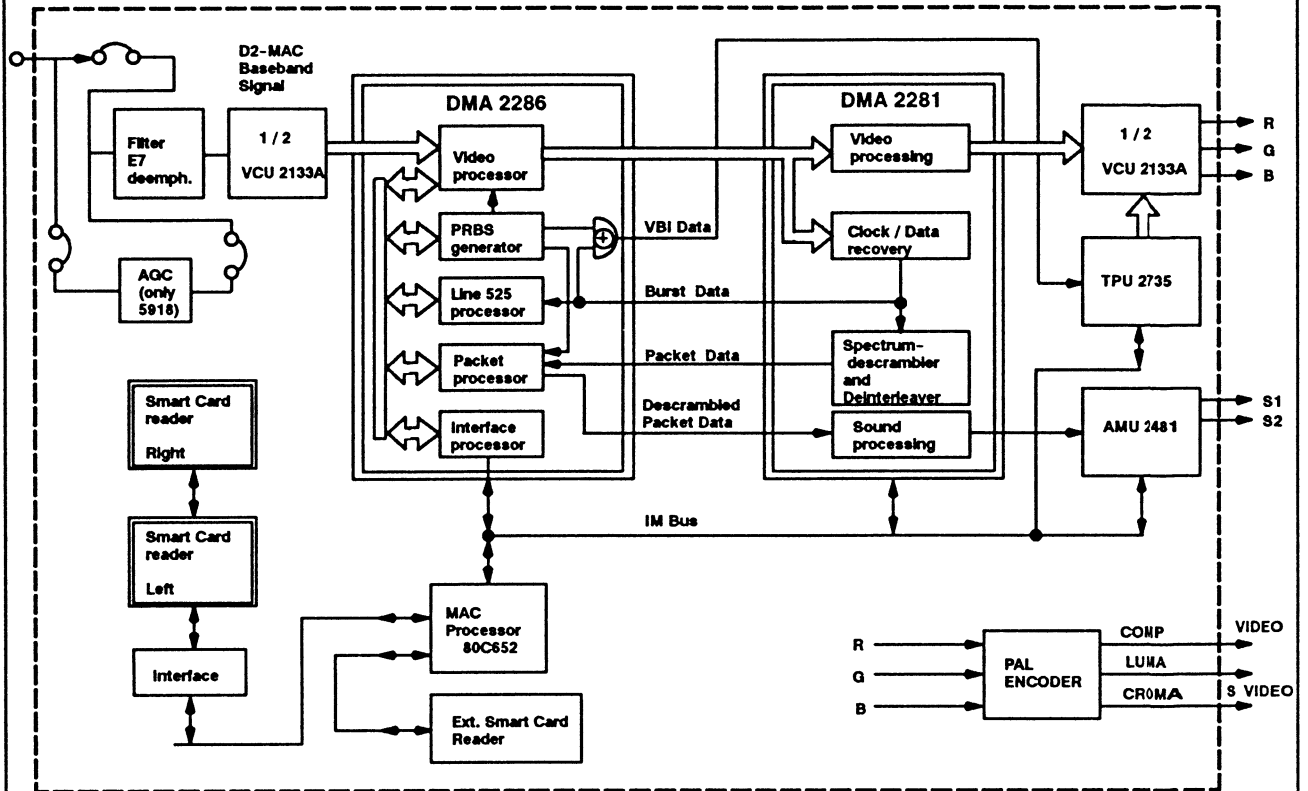
Main PC Board: Sound block Block Diagram IA61 TDA 8741



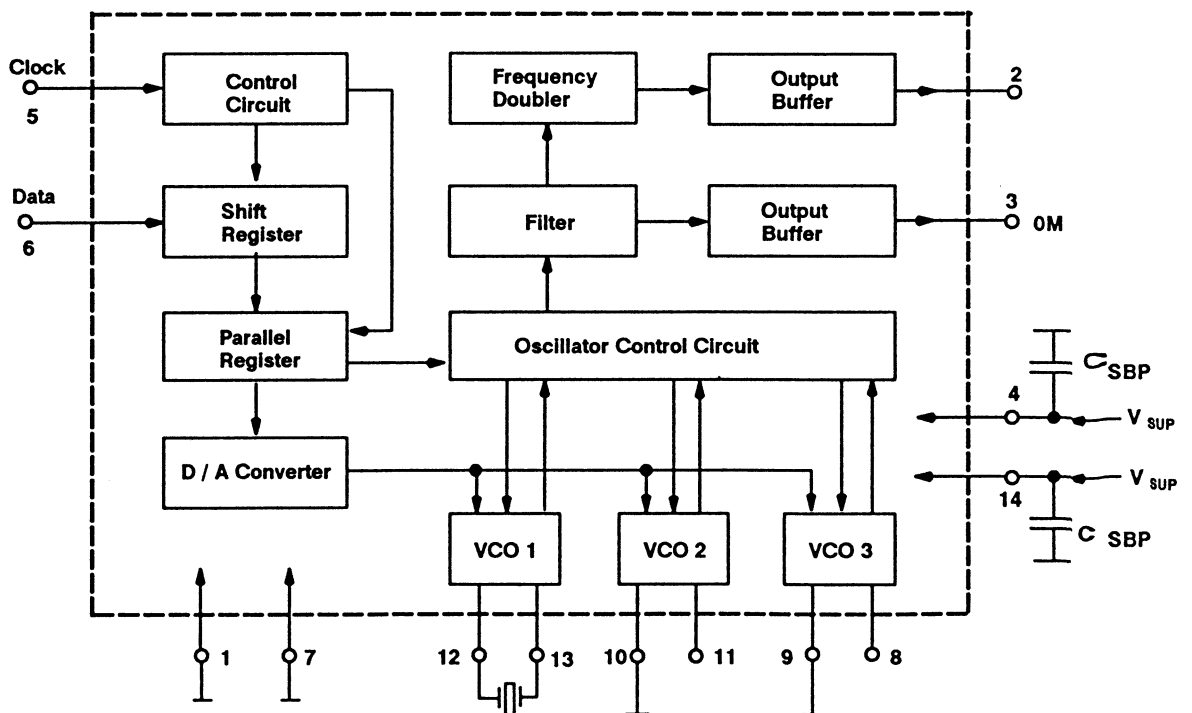
Tuner Module: Block Diagram IT01 TDA 6151X



Transcoder Module: MAC signal processing and communication

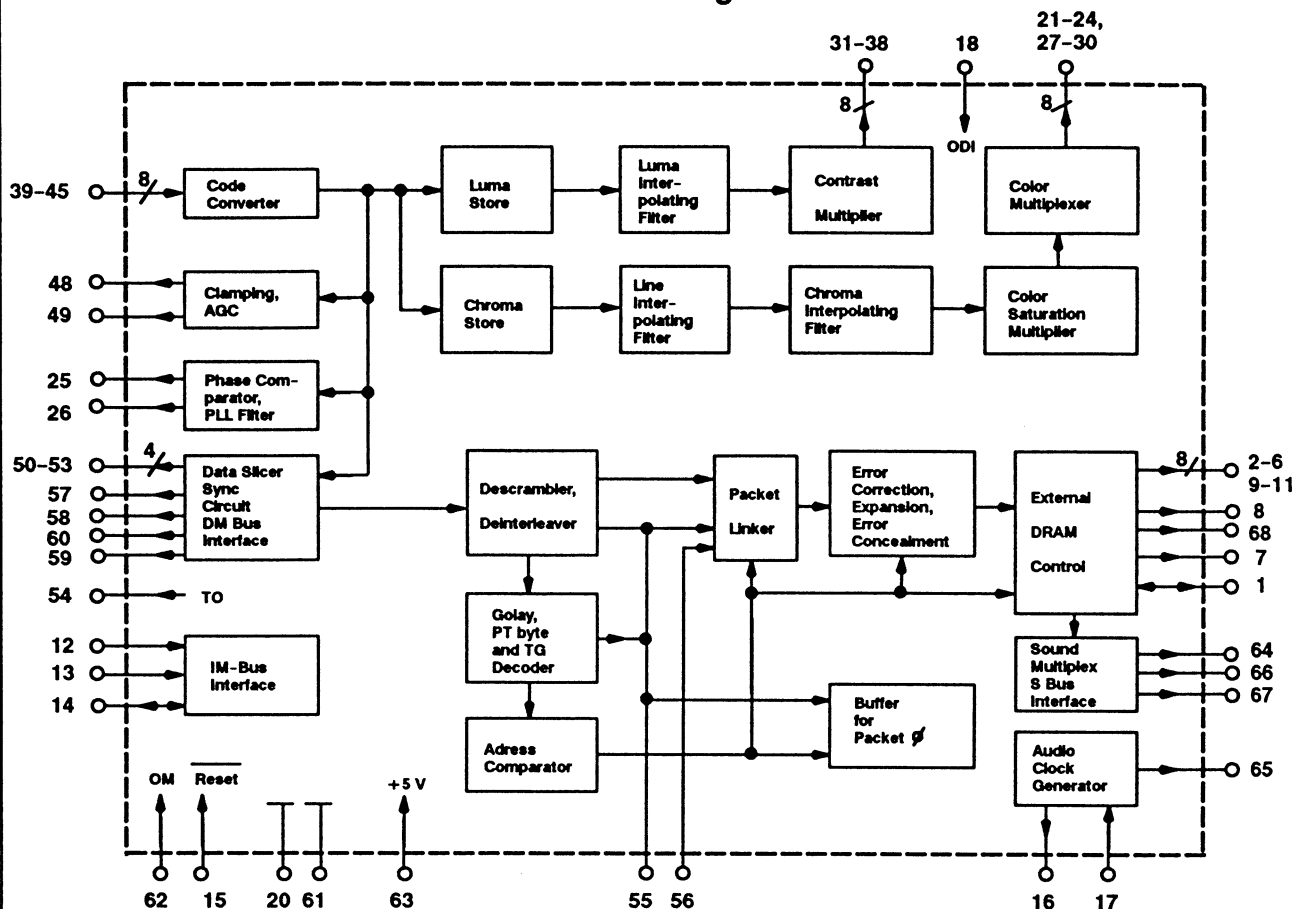


Transcoder Module: Block diagram IM 02 MCU 2600

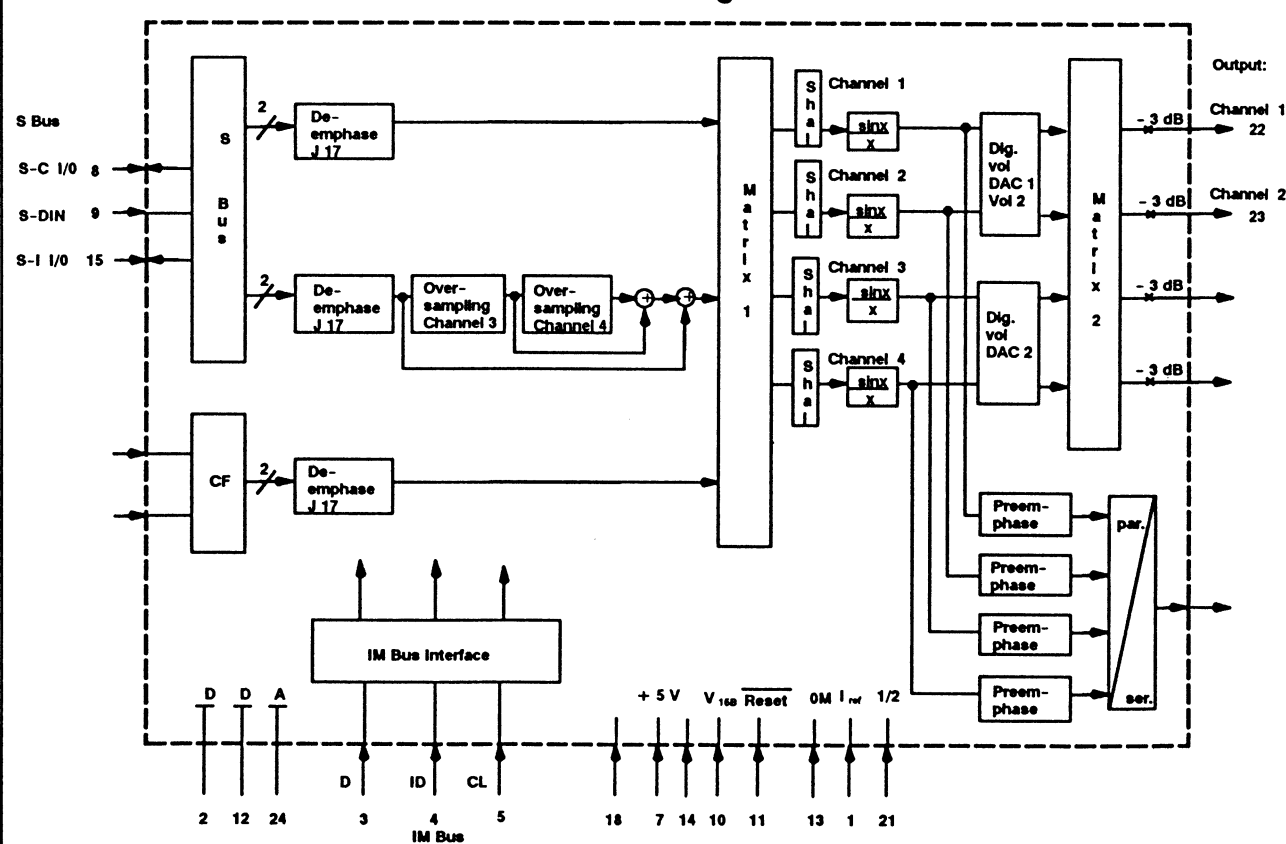


Block diagram

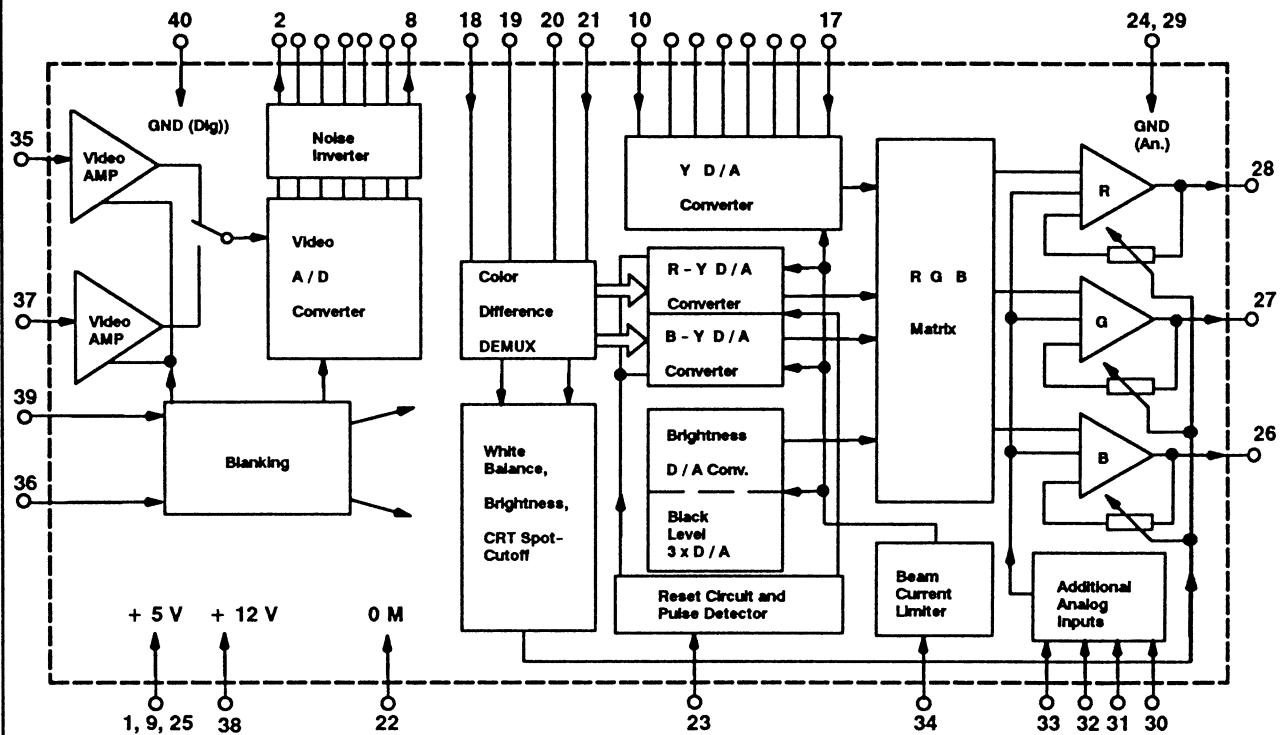
Transcoder Module: Block diagram IM 03 DMA 2281



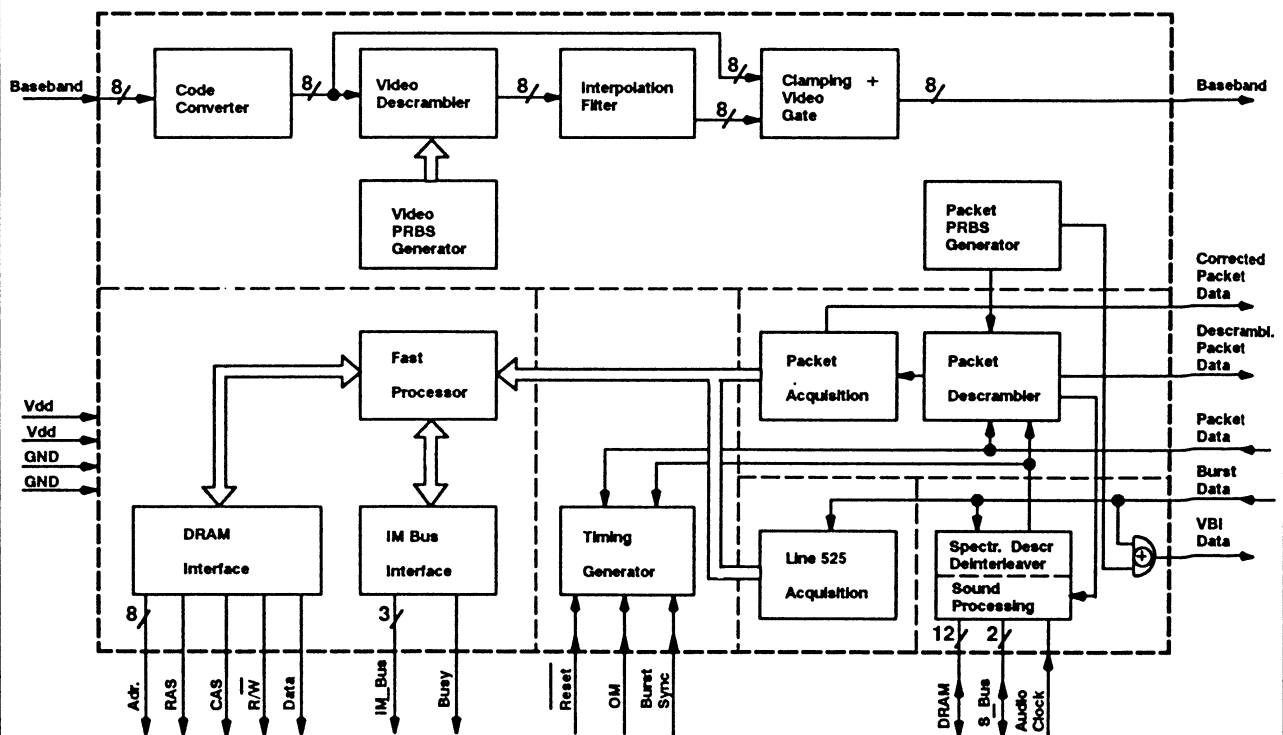
Transcoder Module: Block diagram IM 04 AMU 2481



Transcoder Module: Block diagram IM 05 VCU 2133A

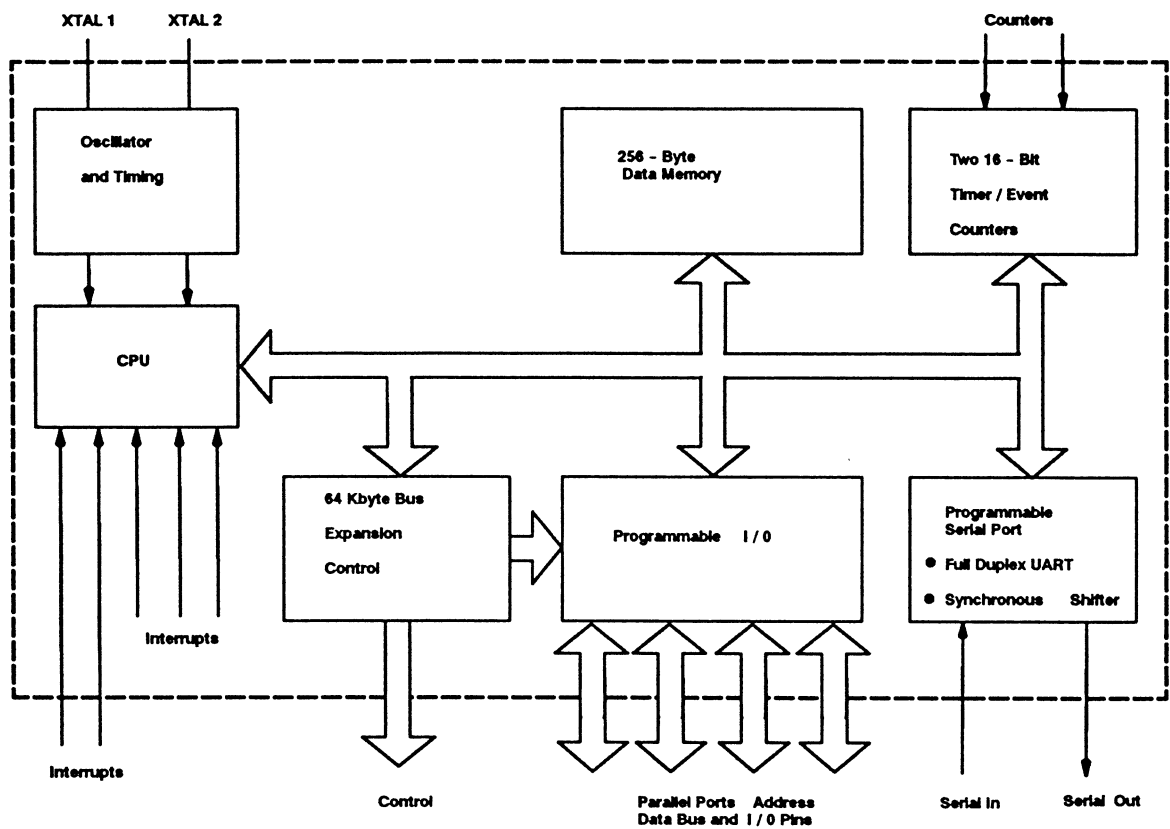


Transcoder Module: Block diagram IM 06 DMA 2286

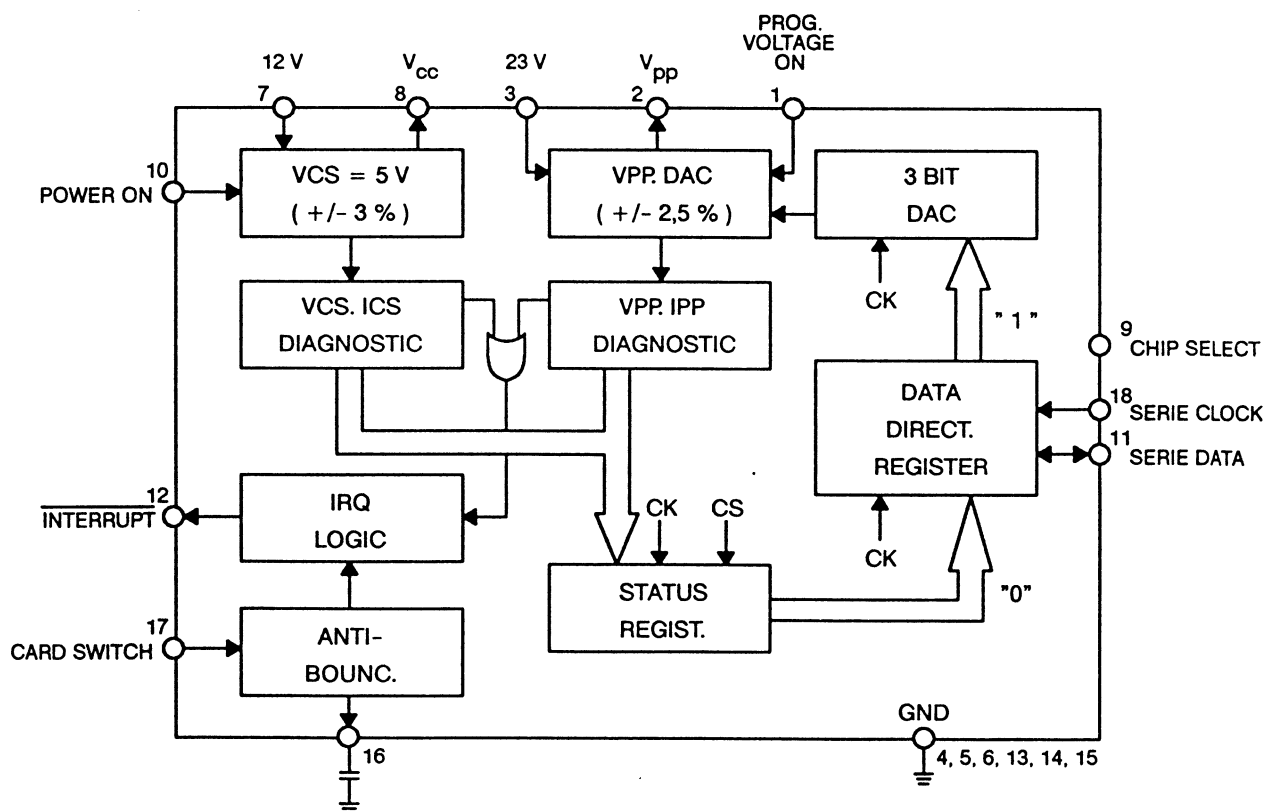


Block diagram

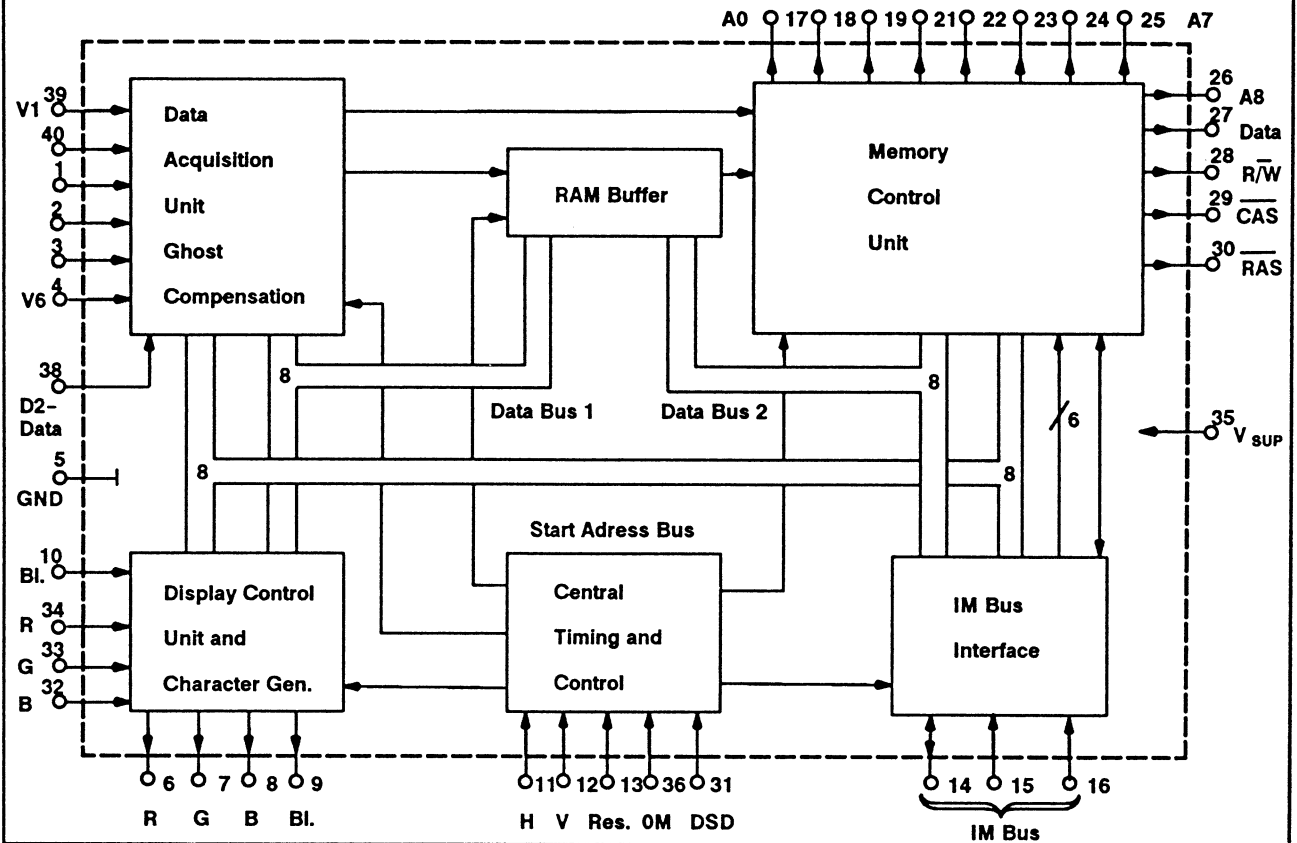
Transcoder Module: Block diagram IM 07 80C 652



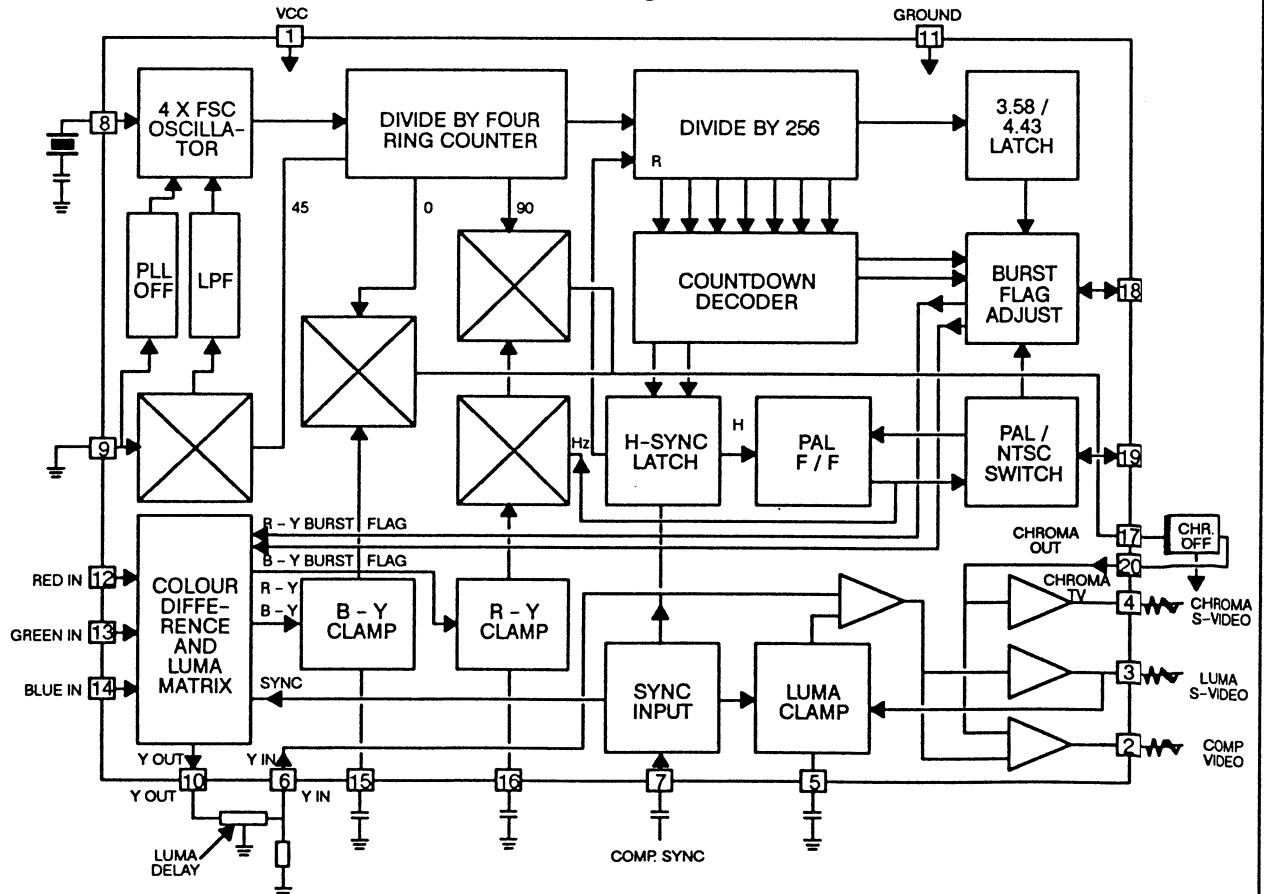
Transcoder Module: Block Diagram IM 11 L6605



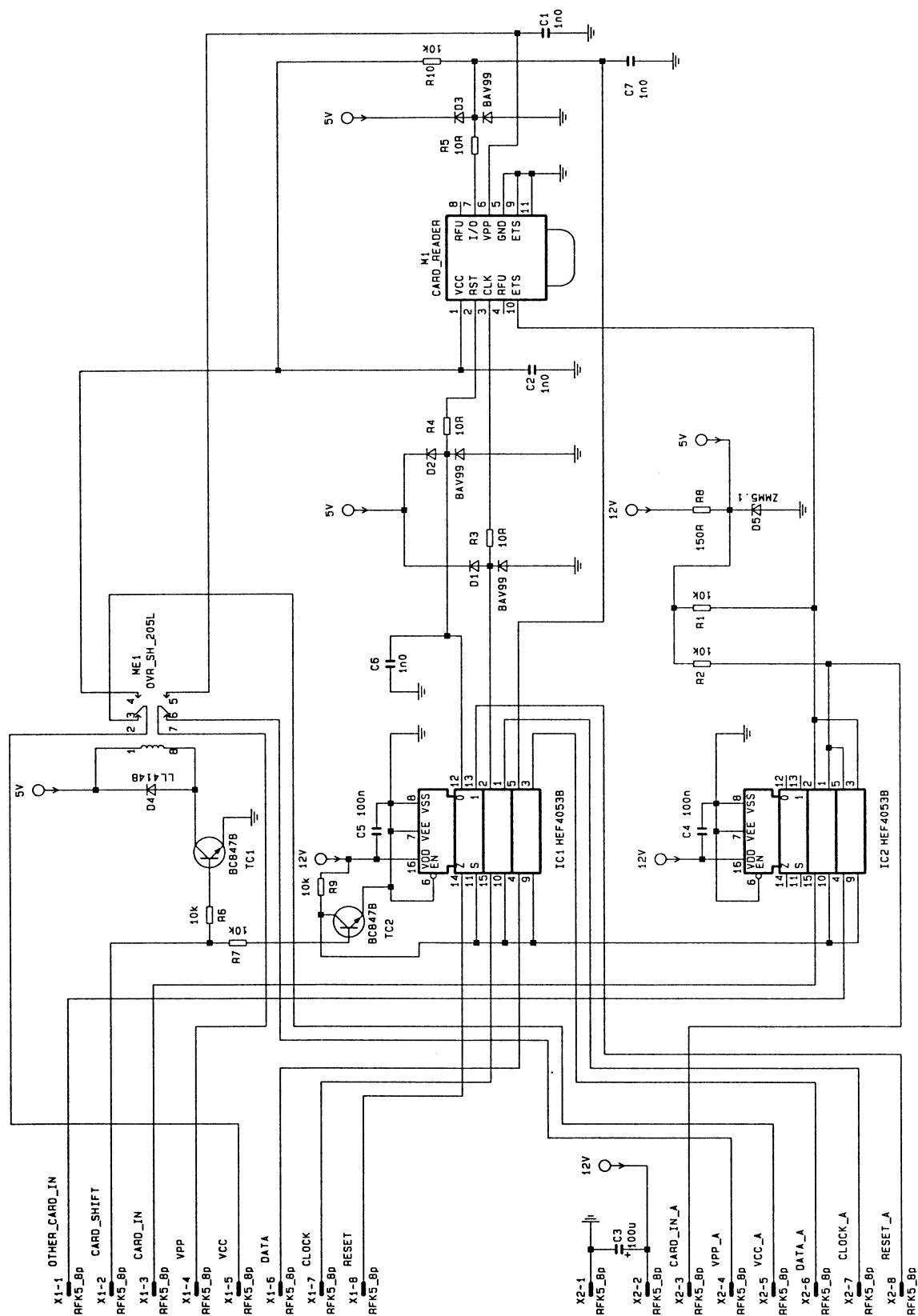
Transcoder Module: Block diagram IM 17 TPU 2735



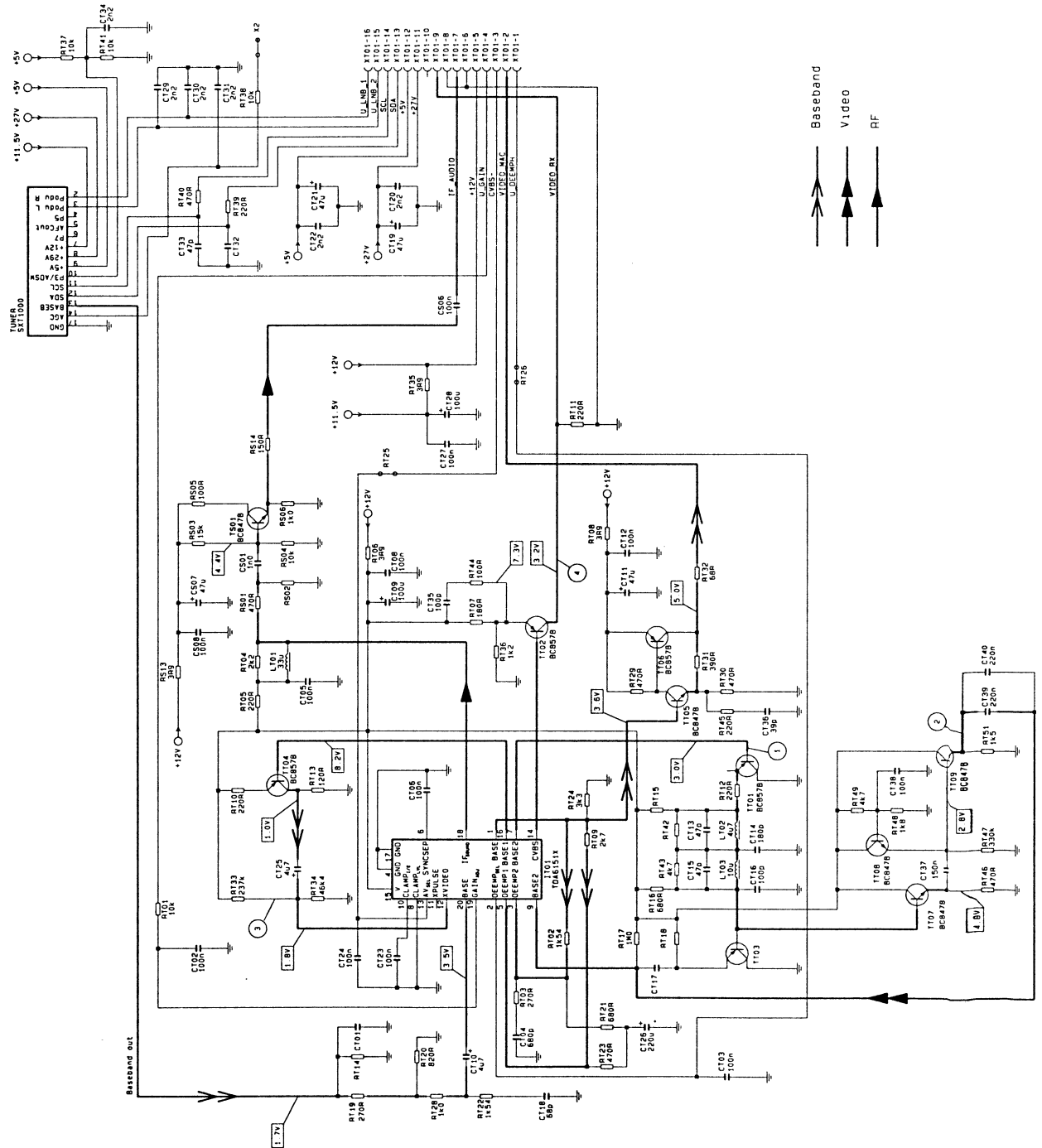
Transcoder Module: Block Diagram IM 19 MC 13077



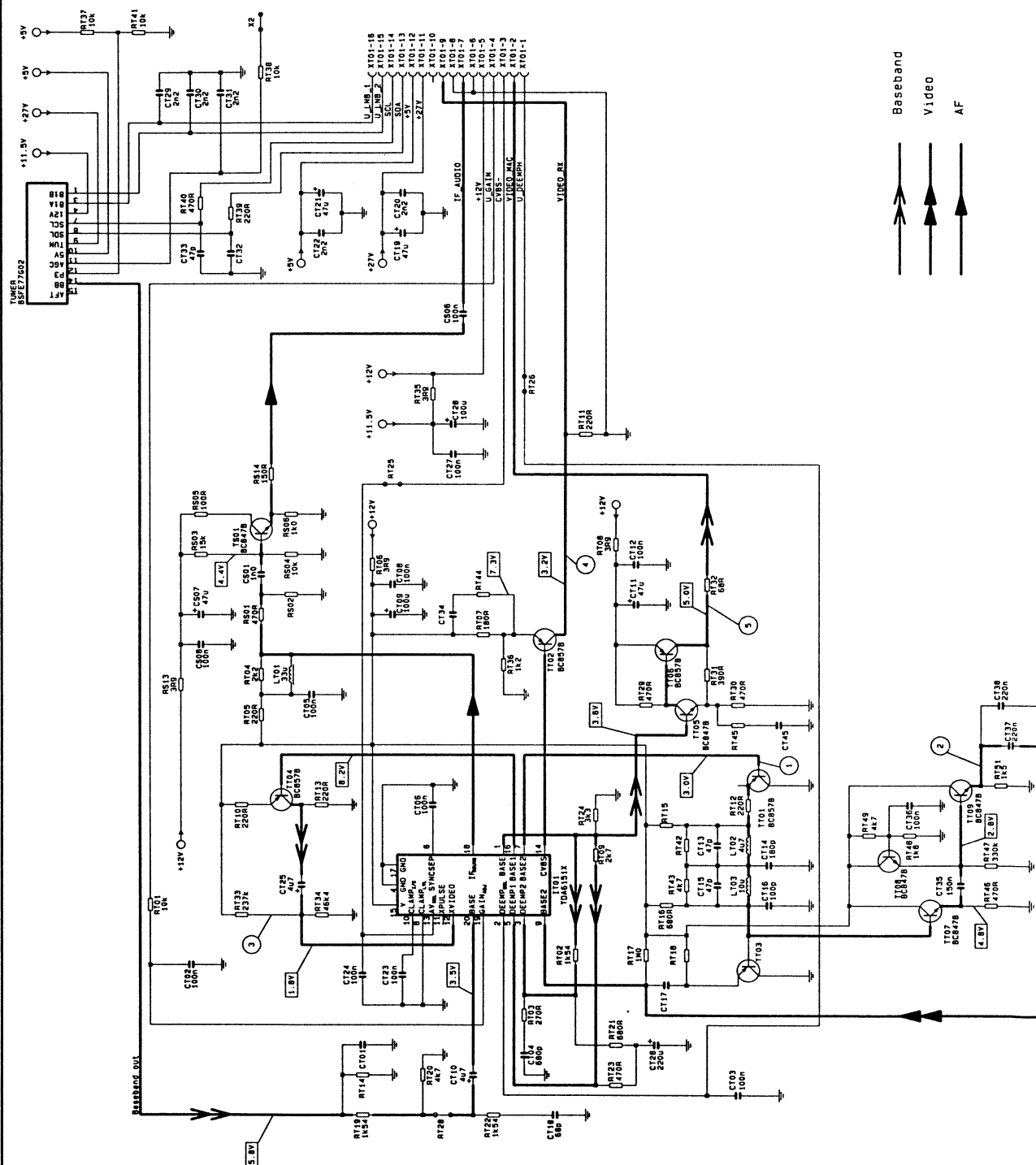
Twin card reader: 55 31752-03



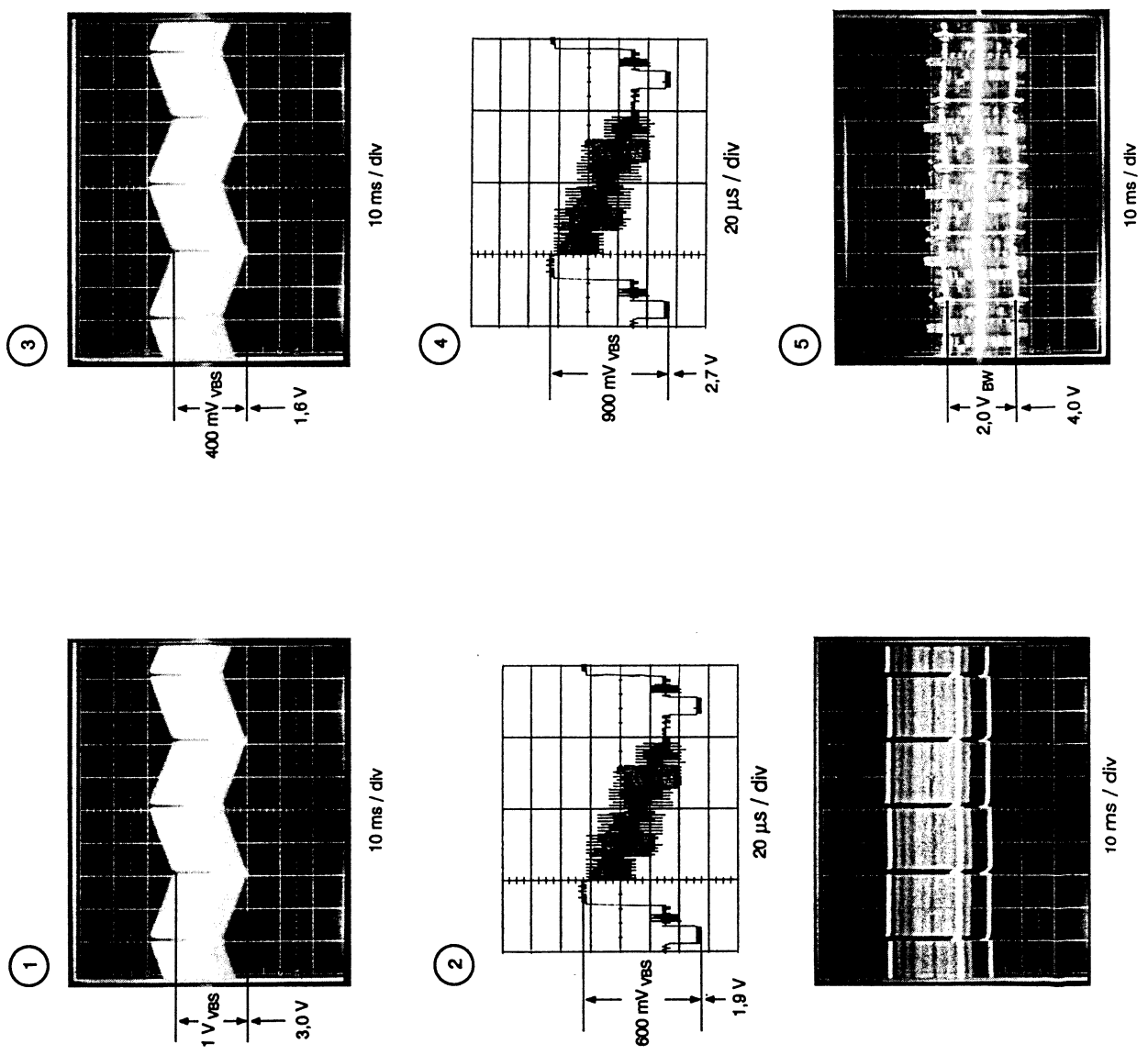
Tuner Module: 55 31751-02



Circuit diagram

Tuner Module: 55 31755-03

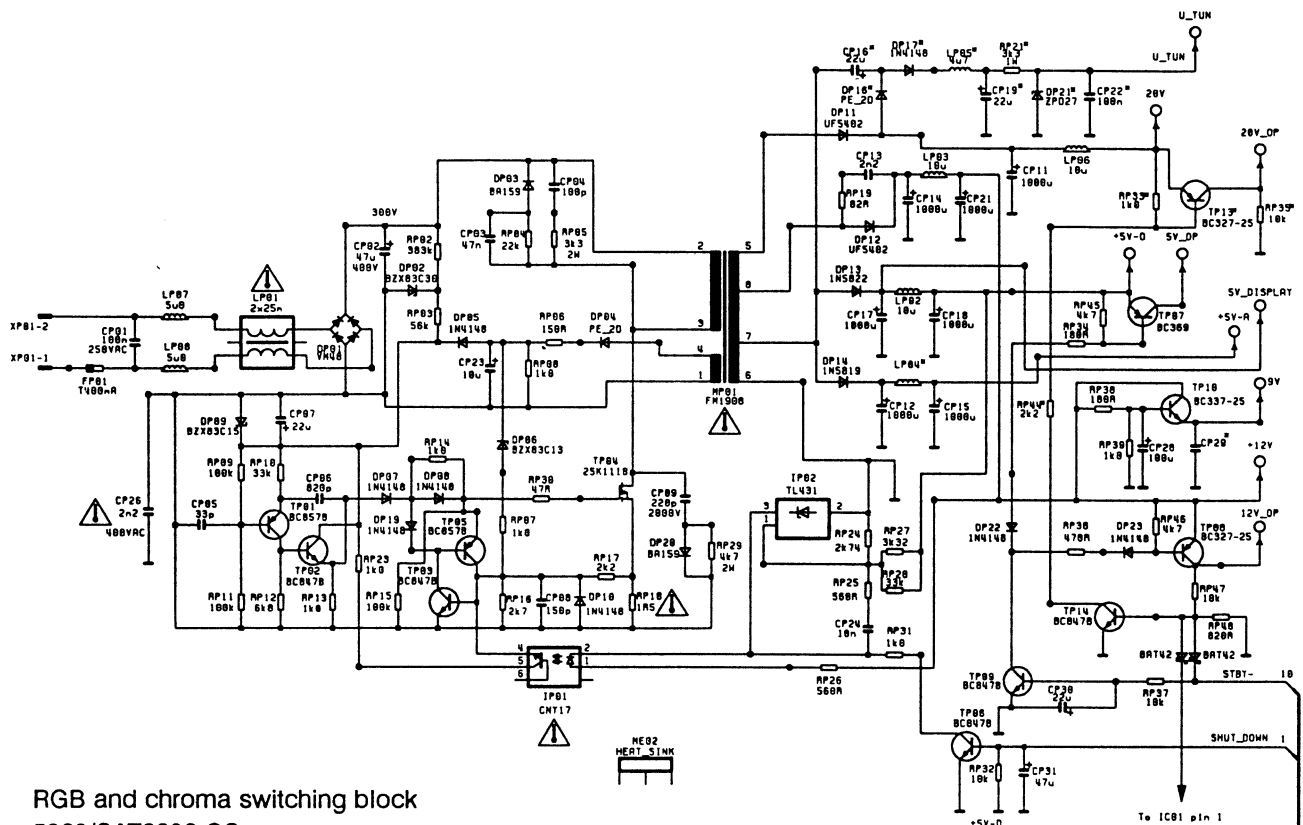
Tuner oscillograms



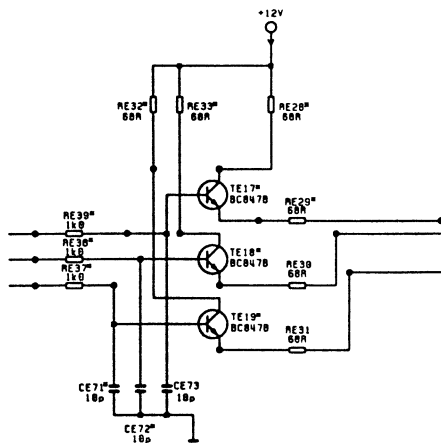
Circuit diagram

Main Board 55 31741-04

Differences compared to 55 31741-05



RGB and chroma switching block
5928/SAT2202 CS.



Differences on main board 55 31741-04 compared to 55 31741-05

Power supply and IC71 was according to circuit diagram above.

Components for U_TUN not fitted in 5918/3002 CS/SD 5710.

In 5918/3002 CS/SD5710 and 5928/SAT2202 CS RGB drivers were according to circuit diagram above.

In 5918/3002 CS/SD5710 RE34 did not exist. TE81 collector was directly connected to +12V.

